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ABSTRACT

This guide is a consequence of Act 750 of the Louisiana Legislature, which mandated the development and establishment of statewide curriculum standards for required subjects for the public elementary and secondary schools. Ten domains of mathematical content have been identified for use in this guide: (1) Sets; (2) Numeration; (3) Whole Number Operations; (4) Fractions and Operations; (5) Decimals and Decimal Operations; (6) Percent, Ratio, and Proportion; (7) Squares and Square Root; (8) Relations and Functions; (9) Measurement and Estimation; and (10) Geometry. The document has three major sections. The first section outlines suggested course content for each of grades K-8. Part two lists minimum standards for basic skills, listed under the 10 content domains. The third section lists three activities for each objective of each domain. The first activity suggested is aimed at the average learner, the second is intended to challenge the more able students, and the third activity is directed to pupils who have special needs and will profit more from hands-on experiences. It is felt that teachers should view the activities provided as tools that may be used a variety of ways to stimulate instruction. (MP)

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STATE OF LOUISIANA
DEPARTMENT OF EDUCATION

MATHEMATICS CURRICULUM GUIDE K-8

BULLETIN 1609
1981

J. KELLY NIX
State Superintendent

U.S. DEPARTMENT OF EDUCATION
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STATE OF LOUISIANA

DEPARTMENT OF EDUCATION

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Issued by

Office of Academic Programs

J. KELLY NIX

State Superintendent

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FOREWORD

Act 750 of the 1979 Louisiana Legislature established the Louisiana Competency-Based Education Program. One of the most important provisions of Act 750 is the mandated development and establishment of statewide curriculum standards for required subjects for the public elementary and secondary schools. These curriculum standards include curriculum guides which contain minimum skills, suggested activities, and suggested materials of instruction.

During the 1978-79 school year, curriculum guides for mathematics were developed by advisory and writing committees representing all levels of professional education and all geographic areas across the State of Louisiana. The major thrust of the curriculum development process in each of the guides has been the establishment of minimum standards for student achievement. The curriculum guides also contain activities designed to stimulate learning for those students capable of progressing beyond the minimums.

During the 1980-81 school years, the Mathematics Curriculum Guide K-8 was piloted by teachers in school systems representing the different geographic areas of the state as well as urban, suburban, inner-city, and rural schools. The standard populations involved in the piloting reflected also the ethnic composition of Louisiana's student population. Participants involved in the piloting studies utilized the curriculum guides to determine the effectiveness of the materials that were developed. Based upon the participants' recommendations at the close of the pilot study, revisions were made in the curriculum guides to ensure that they are usable, appropriate, accurate, comprehensive, and relevant.

Following the mandate of Act 750, curriculum standards for all required subjects are now ready for full program implementation. The statewide implementation is not, however, the end of the curriculum development process. A continuing procedure for revising and improving curriculum materials must be instituted to ensure that Louisiana students have an exemplary curriculum available to them--a curriculum that is current, relevant, and comprehensive. Such a curriculum is essential for the achievement of the goal of this administration which is to provide the best possible educational opportunities for each student in the public schools of Louisiana.

I wish to express my personal gratitude and that of the Department of Education to each educator whose efforts and assistance throughout the curriculum development processes have been and continue to be vital to the attainment of our curriculum goals.

J. KELLY NIX

ACKNOWLEDGMENTS

This publication represents the cooperative efforts of personnel in the Bureau of Elementary Education and the Bureau of Curriculum, Inservice, and Staff Development in the Office of Academic Programs, Louisiana State Department of Education. Special recognition goes to Mrs. Bonnie Ross and Ms. Helen Maskas, Supervisors, who served as chairpersons in the development, the piloting, and the revision of the guide. Special commendation goes also to the supervisors in the Bureau of Elementary Education and to the pilot teachers over the State of Louisiana who worked diligently to make this publication a reality.

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RATIONALE

The adoption of the minimum skills in mathematics, K-12, has accentuated a need for the development of a curriculum guide which will assist the teaching of mathematics in the schools of Louisiana. To accomplish this purpose, the following tasks have been identified:

1. Domains or major topics which are embodied in mathematics.
2. Performance objectives which will enable teachers to more accurately evaluate each child's performance in relationship to these specific objectives.
3. Activities for each objective including enrichment and ideas for children with special needs so that the teaching of each objective can be done with meaning and variety.

Within each domain, specific content has been identified and expressed as performance objectives necessitating particular student behaviors. The objectives are arranged along a continuum which will allow the student to proceed at a rate consistent with his ability. Furthermore, by working with objectives that identify observable outcomes, the student and the teacher can readily assess progress in terms of the stated objectives.

The activities included in the guide are merely suggested and may be used by different teachers in a variety of ways to stimulate the teaching of mathematics. Teachers should feel free to use their own innovative teaching ideas and activities to enhance their math program.

INTRODUCTION

The mathematical content contained in the Mathematics Curriculum Guide K-8 has been identified within ten domains. The domains are:

1. Sets
2. Numeration
3. Whole Number Operations
4. Fractions and Operations
5. Decimals and Decimal Operations
6. Percent, Ratio, and Proportion
7. Squares and Square Root
8. Relations and Functions
9. Measurement and Estimation
10. Geometry

Within each domain, content has been identified and expressed as behavioral objectives. Approximately 530 objectives are contained in this publication. The objectives are arranged so as to allow children to advance at rates consistent with their abilities.

USING THE GUIDE

In order to use this publication effectively, the teacher must become familiar with each section and its relationship to other elements of the program.

MINIMUM STANDARDS

Because the elementary mathematics curriculum has been designed to complement the concept of the minimum standards for mathematics, those skills have been incorporated into this guide for grades K-8. The standards appear as in Bulletin 1497 showing the grade level at which they should be introduced (*), ongoing (**), and mastered (***). Page references for related activities are given for each skill.

COURSE CONTENT

The course content far exceeds the material listed in the minimum standards of mathematics for the State of Louisiana. Extreme care has been taken to ensure that every skill and every concept in the minimum standards are included in the curriculum guide. Many minimum skills and concepts occur at an earlier level in the course content than they do in the minimum standards.

The sequencing of the content material in the course content is the result of the expertise of the development committee. It follows conventional sequences but is not patterned after any particular mathematics textbook. However, material in the guide can be found at the same grade level in the majority of the mathematics textbooks on the state approved list.

For the teacher who has students performing above or below grade levels, the course content at the appropriate levels should be used in individualizing instruction for those pupils. Because students will vary in rate and degree of mastery of specific skills listed at each grade level, reference to the minimum standards is crucial in meeting needs. To assist the teacher in the planning process, page references to suggested activities are listed adjacent to the skills for which they have been designed.

The conscientious teacher will use the course content as a framework upon which a year's instruction may be built. Careful and continuous diagnosis and prescription of individual needs in relation to this framework should be an integral part of the program. By checking frequently to make sure that entry, ongoing, and mastery level skills (indicated by asterisks in the course content) have been included, the teacher can be certain that the testable minimum competencies have been presented.

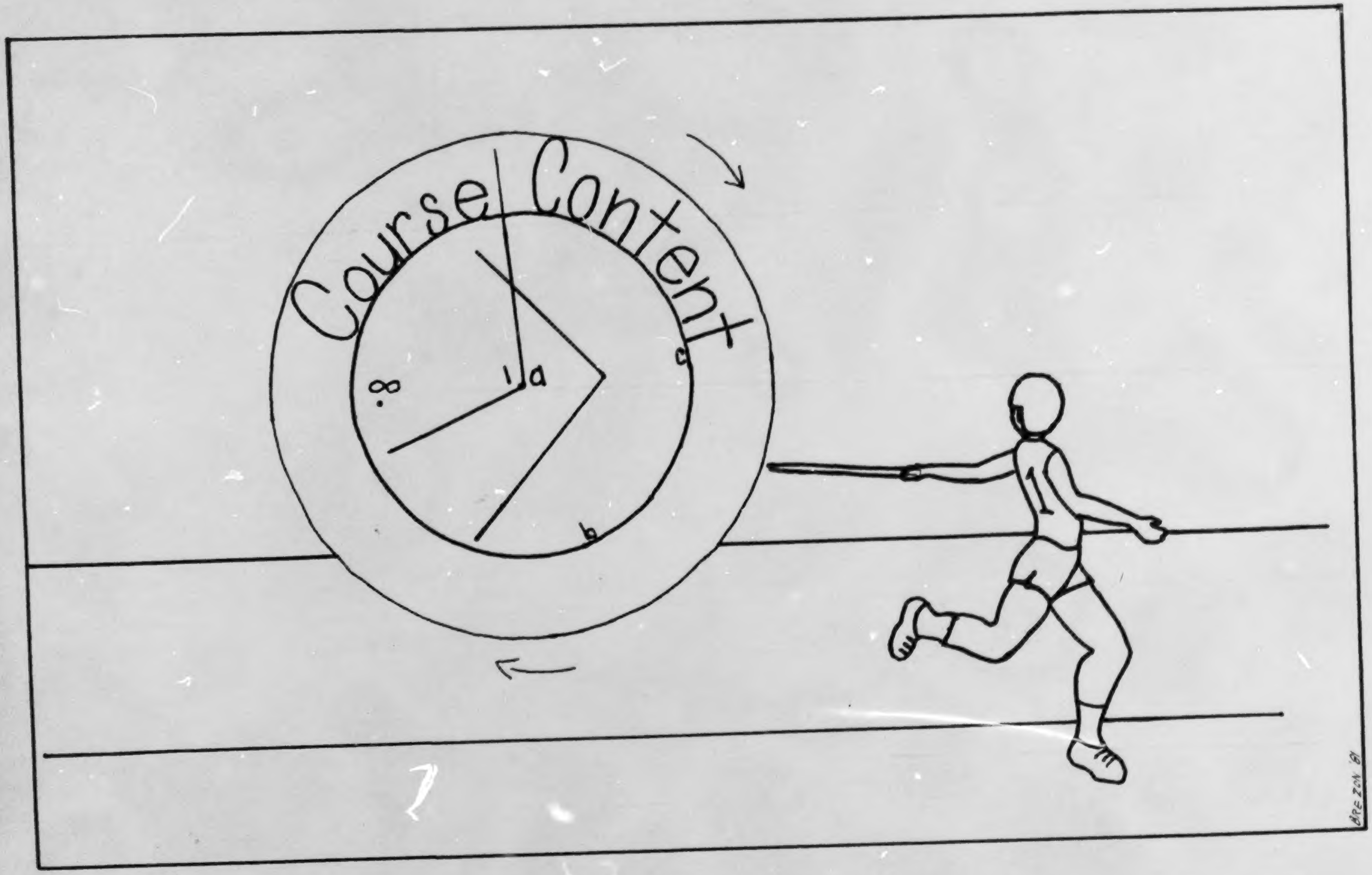
SUGGESTED ACTIVITIES

The suggested activities provide specific ideas which a teacher may use to promote effective instruction, thereby resulting in improved learning on the part of the students. An attempt has been made in the suggested listing of the activities to meet the needs of all students:

1. The first activity is aimed at the average learner.
2. The second activity is intended to challenge the more able students who would benefit from enrichment.
3. The third activity is directed to students who have special needs and who will profit more from hands-on experiences.

To use this publication, locate the desired topic in the course content or the minimum standards and then turn to the activity page indicated to the right of the skill or standard.

This publication is designed to supplement and enrich local efforts to improve the quality of mathemathics instruction. It should be adapted to needs and resources. Space is provided for teachers to use in cross-referencing textbooks and other materials with the content of the publication and to add other objectives and activities which may be useful in helping students accomplish their goals.


Course Content
1
a
8
b
c
1
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COURSE CONTENT

Readiness

Curriculum Outline	Performance Objectives	Activity Page Number
I. Introduction to Sets		
A. Identification of Sets	A. To develop a working concept of sets, the student will be able to:	
	1. Identify and describe a set.	228
	***2. Identify members (elements) of a set.	229
	*3. Describe an empty set.	240
	*4. Identify equivalent and non-equivalent sets.	235
	*5. Recognize related and non-related objects in a collection.	238
	***6. Compare the number of members (elements) in two sets indicating which is more or less.	230
	*7. Order sets of pictures in designated order (sets of 10 or less elements.	239
B. Concrete and Semi-Concrete objects in sets	B. To exhibit an understanding of concrete and semi-concrete objects in sets, the student will be able to:	
	***1. Recognize a set of concrete objects from a given description.	231

COURSE CONTENT

Readiness

Curriculum Outline	Performance Objectives	Activity Page Number
	2. Manually arrange concrete and semi-concrete objects in one-to-one correspondence.	232
	*3. Match concrete and semi-concrete objects in a one-to-one correspondence.	234
C. Cardinal Numbers	C. To demonstrate an understanding of cardinal numbers, the student will be able to:	
	***1. Recognize the cardinal number of a set of not more than ten members (elements).	233
	*2. Write the cardinal number of a set of not more than ten members (elements).	237
	*3. Match a numeral with the number of members of a set.	236
	4. Identify sets that are equal in number.	241
	5. Compare and construct sets (one more, one less, limit 10).	242
	*6. Combine the members of a set of concrete objects (sums of 5 members).	244
	*7. Add members to make a set to contain specified number of members (limit 5).	139

COURSE CONTENT

Readiness

Curriculum Outline	Performance Objectives	Activity Page Number
II. Numeration		
A. Counting	A. To demonstrate a working knowledge of number concepts, the student will be able to:	
	***1. Count concrete objects (1-10).	246
	***2. Count semi-concrete objects (1-10).	247
	***3. Count to 10 by ones.	249
	***4. Recognize numbers in sequential order (1-10).	252
	*5. Recognize numbers in random order (1-10).	253
	*6. Repeat a pattern from a given sequence.	258
	*7. Identify position of location: up-down; top-bottom; right-left; above-below; nearer-farther.	273
B. Writing	B. To demonstrate a working knowledge of number concepts, the student will be able to:	
	*1. Write numbers in sequential order (1-10).	254

COURSE CONTENT

Readiness

Curriculum Outline	Performance Objectives	Activity Page Number
	2. Recognize the ordinal numbers corresponding to the cardinal numbers (1-10), (1-5).	279
	*3. Supply missing numbers in a sequence (1-10).	257
	*4. Identify and use ordinal numbers through fifth.	278
III. Whole Number Operations		
A. Readiness of Addition	A. To develop an understanding of joining two sets, the student will be able to:	
	1. Combine two sets and identify the number of objects altogether (2-6).	328
	2. Add members to make a set to contain a specified number of members.	330
	3. Add basic facts (sums 1-18) using concrete objects and semi-concrete objects.	331
	4. Add basic facts (sums to 10).	335
B. Readiness of Subtraction	A. To develop an understanding of separating sets, the student will be able to:	
	1. Separate a given set of 6 or less members into 2 groups and find the number of elements in each set.	357

COURSE CONTENT

Readiness

Curriculum Outline	Performance Objectives	Activity Page Number
IV. Fractions and Operations		
A. Fractional Parts	A. To develop an understanding of fractional parts, the student will be able to identify the following: whole, part, all, most, some, none.	
B.	B. To demonstrate an understanding of fractional parts, the student will be able to recognize the following:	
	1. Two unequal parts.	419
	2. Larger and smaller part.	419
	3. Largest and smallest part.	419
	***4. One-half of a concrete object.	420
	5. One-fourth of a concrete object.	420
	6. One-third of a concrete object.	420
V. Measurement and Estimates		
A. Time	A. By applying concepts of time of events, the student will be able to:	
	*1. Relate concepts of: (a) before-after-between (b) morning-noon-afternoon-night (c) yesterday-tomorrow (d) now-later	584

COURSE CONTENT

Readiness

Curriculum Outline	Performance Objectives	Activity Page Number
	*2. Name days of the week and months of the year.	585
	3. Sequence order of events.	586
	4. Identify the hour and minute hands on the clock.	588
B. Money	B. To develop an understanding of money, the student will be able to:	
	***1. Identify the following coins: cent, nickel, dime and quarter.	597
	2. Recognize the value of 1-10 pennies.	597
C. Size	C. To develop an understanding of length and weight, the student will be able to:	
	*1. Identify shorter and longer objects.	580
	*2. Identify lighter or heavier objects (concrete).	582
	***3. Identify the smaller or larger object.	578
	***4. Identify the objects that are the same or different.	579

COURSE CONTENT

Readiness

Curriculum Outline	Performance Objectives	Activity Page Number
VI. Geometry		
A. Simple closed figures	A. To develop an understanding of simple closed figures, the student will be able to:	
	1. Distinguish between an open and closed figure.	641
	2. Distinguish between inside and outside of a simple closed figure.	642
	*3. Identify and draw the following simple closed figures: (a) circle (b) triangle (c) rectangle (d) square	643
B. Classification	B. To exhibit a working knowledge of shapes, the student will be able to:	
	*1. Classify objects according to shape (alike and different).	646
	2. Recognize a sphere, prism, cylinder, cone.	644
	*3. Recognize colors and group according to color.	645

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
I. Sets		
A. Identification	A. To develop a proficiency in working with sets, the learner will be able to:	
	***1. Identify equivalent and non-equivalent sets.	235
	**2. Identify the empty set.	240
	3. Identify sets that are equal.	241
B. Concrete and Semi-concrete Sets	B. To develop an understanding of concrete and semi-concrete sets, the student will be able to:	
	***1. Match concrete and semi-concrete concrete objects in a one-to-one correspondence.	234
	**2. Recognize related and non-related objects in a collection.	238
	3. Manually arrange concrete and semi-concrete objects in a one-to-one correspondence.	232
C. Cardinal Numbers	C. To show proficiency in working with cardinal numbers, the student will be able to:	
	***1. Write the cardinal number of a set of not more than 10 members.	237

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	2. Write the cardinal number of a set.	237
	***3. Match a numeral with the number of members of a set.	236
	*4. Compare and construct sets (one more, one less; limit 10).	242
	***5. Combine the members of a set of concrete objects (sums of 5 members).	244
	***6. Add members to make a set to contain specified number of members (limit to 5 members).	330
	*7. Use meaningful life situations to combine a set of concrete or semi-concrete objects (sums of 18).	244
D. Ordering	D. To demonstrate an understanding of ordering of sets, the student will be able to:	
	**1. Arrange sets of pictures in a designated order (sets of 10 or less elements).	237
II. Numeration		
A. Recognition	A. To exhibit a proficiency in recognition of numbers, the student will be able to:	

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	1. Recognize numbers in sequential order (1-100).	255
	***2. Recognize numbers in random order (1-10).	253
	3. Recognize numbers in random order (1-100).	256
B. Counting	B. To develop counting skills, the student will be able to:	
	*1. Count to one hundred by ones.	250
	*2. Count to one hundred by tens.	250
	*3. Count to one hundred by fives.	250
	*4. Count to one hundred by twos.	250
	**5. Identify a position with reference to a given location (up-down, right-left, above-below).	273
C. Writing	C. To develop writing number skills, the student will be able to:	
	***1. Write numbers in sequential order (1-10).	254
	***2. Supply missing numbers in a sequence (1-10).	257

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***3. Repeat a pattern from a given sequence.	258
	*4. Write missing numbers in a sequence through one hundred.	260
	*5. Write the number that comes before (after) a given number (1-100).	261
	6. Supply the missing numbers in a sequence of odd or even numbers.	264
	*7. Write to one hundred by ones.	271
	*8. Write to one hundred by tens.	271
	*9. Write to one hundred by fives.	271
	*10. Write to one hundred by twos.	271
	11. Read and write numbers through one thousand.	282
D. Ordinal Numbers	D. To develop an understanding of ordinal numbers, the student will be able to identify and use ordinal numbers through nineteenth.	
	***1. Identify and use ordinal numbers through fifth.	278
	*2. Identify and use ordinal numbers through tenth.	278

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	3. Recognize the ordinal number corresponding to the cardinal numbers (1-10).	279
	4. Use ordinal numbers through nineteenth.	278
E. Number Words	E. To develop a recognition of number words, the student will be able to identify the names of numbers (1-10).	
	***1. Identify the names of numbers (1-10).	284
	*2. Identify number words 11-19.	284
	*3. Identify number words for multiples of 10.	285
F. Place Value	F. To develop a proficiency in place value, the student will be able to:	
	*1. Recognize the place value of ones and tens.	287
	2. Recognize place value through hundreds.	287
	*3. Group concrete and semi-concrete objects in tens.	291
G. Symbols	G. To develop an understanding of symbols to be used, the student will be able to:	
	*1. Identify and use the symobls +, -, =.	294

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*2. Recognize the symbol for greater than (>), and is less than (<).	296
	*3. Compare the numbers zero through 99 using > or <	296
H. Zero	H. To develop an understanding of zero, the student will be able to:	
	*1. Recognize zero as the cardinal number of the empty set.	274
	*2. Use zero as the identity element in addition.	275
III. Whole Number Operations		
A. Addition	A. To develop proficiency in addition skills, the student will be able to:	
	*1. Identify the parts of an addition problem.	329
	*2. Add members to make a set to contain a specified number of members.	330
	***3. Add basic facts (sums 1-18) using concrete objects and semi-concrete objects.	331
	4. Give basic addition facts (1-10) in rapid response drill, written and oral.	332

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***5. Add basic facts (sums to 10).	335
	*6. Add basic facts (1-18).	335
	*7. Add three one-digit numbers (sums to 10).	337
	*8. Add a two-digit number and a one-digit number (no regrouping).	338
	*9. Compute sums to ninety-nine with zero in one of the two addends.	340
	*10. Add two two-digit numbers (no regrouping).	341
	11. Check sums by adding in reverse order.	342
	***12. Solve word problems using the operation of addition of whole numbers (1-10).	710
	13. Solve word problems involving the addition of 3 numbers.	710
B. Subtraction	B. To develop proficiency in subtraction skills, the student will be able to:	
	*1. Identify the parts of a subtraction problem (minuend-subtrahend-difference).	358

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	2. Give subtraction facts with minuends to ten in rapid response drill, written or oral.	359
	*3. Subtract a one-digit number from a two-digit number (minuend to 18) using basic facts.	360
	*4. Compute differences to ninety-nine with a zero in the subtrahend.	361
	*5. Subtract a one-digit number from a two-digit number (no regrouping).	362
	*6. Subtract a two-digit number from a two-digit number (no regrouping).	362
	7. Subtract a one-digit number [illegible] three-digit number (no regrouping[illegible]	366
	8. Subtract a two-digit number from a three-digit number (no regrouping).	366
	9. Subtract a three-digit number from a three-digit number (no regrouping).	366
	***10. Solve word problems using subtraction with minuends through 10.	710
	11. Check subtraction by addition.	363

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
C. Relationship of Addition and Subtraction	C. To promote an understanding of relationship of addition and subtraction the student will be able to:	
	1. Identify addition and subtraction as inverse operations.	364
	*2. Write number sentences for pictured action.	710
	*3. Supply the answer to an oral addition or subtraction problem (1-10).	710
	*4. Solve word problems using addition and subtraction (sums and minuends less than 100).	710
IV. Fractions and Operations		
A. Thirds, Fourths	A. To develop an understanding of thirds and fourths, the student will be able to:	
	*1. Recognize 1/4 of a concrete object.	420
	*2. Recognize 1/3 of a concrete object.	420
B. Fractions	B. To develop an understanding of fractions, the student will be able to:	

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*1. Identify the fractions 1/2, 1/3, and 1/4.	421
V. Measurement and Estimation		
A. Time	A. To develop an understanding of time, the student will be able to:	
	***1. Relate concepts of before-after-between, now-later, morning-noon-night-afternoon, yesterday-tomorrow.	584
	2. Relate concepts of time to events (morning, noon, afternoon, and night).	587
	*3. Identify the hour and minute hand on the clock.	588
	*4. Tell time on the hour.	588
	*5. Tell time on the half-hour.	588
	6. Sequence order of events.	586
B. Calendar	B. To develop an understanding of the calendar, the student will be able to:	
	**1. Name the days of the week and the months of the year.	585
	*2. Use the calendar to determine designated information.	589

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
C. Money	C. To develop an understanding of money, the student will be able to:	
	1. Identify the ¢ symbol.	599
	2. Associate the ¢ symbol with the value of cent, nickel, dime, quarter, and half-dollar.	599
	*3. Recognize the monetary value of cent, nickel, dime, and quarter.	599
D. Comparison	D. To develop an understanding of comparison, the student will be able to:	
	***1. Identify the shorter or longer object.	580
E. Linear Measure Customary-Metric	E. To develop an understanding of comparison, the student will be able to:	
	*1. Identify the inch and the foot as units of customary linear measure.	605
	2. Measure using the inch and the foot on a ruler.	605
	3. Identify the centimeter and meter as units of metric linear measure.	605
	4. Measure lengths to the nearest inch.	607
	5. Measure using the centimeter on a ruler.	608

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
F. Weight/Mass	F. To develop an understanding of weight; the student will be able to:	
	***1. Identify lighter or heavier object (concrete).	582
G. Liquid Measure Customary-Metric	G. To develop an understanding of liquid measure, customary and metric, the student will be able to:	
	*1. Recognize the cup, the pint, and the quart as units of customary liquid measure.	618
	2. Recognize the liter as a metric unit of liquid measure.	618
VII. Geometry		
A. Simple Closed Figures	A. To develop an understanding of simple closed figures, the student will be able to:	
	1. Distinguish between an open and closed figure.	641
	2. Distinguish between inside and outside of a simple closed figure.	642
	***3. Identify and draw the following simple closed figures. (a) circle (c) square (b) triangle (d) rectangle	643

COURSE CONTENT

First Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	4. Draw a facsimile of a circle, a square, a triangle, and a rectangle.	649
	*5. Identify and associate the words circle, triangle, square, and rectangle with the visual representation.	648
	6. Recognize the following shapes: sphere, prism, cylinder, cone.	644
B. Color and Shapes	B. To develop an understanding of shapes, the student will be able to classify objects or pictures according to color and shape.	
	***1. Recognize colors and group according to color.	645
	***2. Classify objects according to shape (like and different).	646
	3. Recognize paths as straight, open, and closed.	647

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
I. Sets		
A. Identification of Sets	A. To exhibit an understanding of sets, the student will be able to:	
	***1. Identify the empty set.	240
	***2. Recognize related and non-related objects in a collection.	238
	3. Identify sets that are equal in number.	241
B. Ordering and Comparing	B. To exhibit understanding in working with ordering and comparing sets, the student will be able to:	
	***1. Order sets of pictures as designated (sets of not more than 10 members).	239
	***2. Compare and construct sets (one more, one less), limited to sets with 10 numbers.	242
C. Cardinal Numbers	C. To demonstrate an understanding of cardinal numbers, the student will be able to:	
	1. Write the cardinal number of a set.	237

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
II. Numeration		
A. Place Value	A. To develop an understanding of place value, the student will be able to:	
	***1. Group concrete and semi-concrete objects in tens.	291
	***2. Recognize place value for ones, tens.	287
	*3. Recognize place value through hundreds.	287
	4. Recognize place value through thousands.	287
B. Counting and Writing	B. To exhibit proficiency in counting and writing numbers, the student will be able to:	
	***1. Count to one hundred by ones, twos, fives and tens.	250
	***2. Write to one hundred by ones, fives and tens.	271
	**3. Write to one hundred by twos.	271
	*4. Read and write numbers through one thousand.	282

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	5. Read and write numbers through ten thousand.	284
	***6. Identify position of location: up-down; top-bottom; right-left; above-below, etc.	273
C. Number Words	C. To develop an understanding of number words, the student will be able to:	
	*1. Identify number words for multiples of ten (20-90).	285
	*2. Identify number words eleven through nineteen.	284
D. Ordinal Numbers	D. To develop an understanding of ordinal numbers, the student will be able to:	
	***1. Identify and use ordinal numbers through tenth.	278
	*2. Use ordinal numbers through nineteenth.	278
E. Number Sequence	E. To develop an understanding of numbers in sequence, the student will be able to:	
	1. Recognize numbers in sequential order (1-100).	255

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	2. Recognize numbers in random order (1-100).	256
	**3. Write missing numbers in a sequence (1-100).	260
	**4. Write the number that comes before and after a given number (1-100).	261
	5. Recognize and write even and odd numbers in sequence (1-100).	263
	**6. Supply the missing numbers in a sequence of odd or even numbers (1-100).	264
	7. Supply the missing numbers in a sequence through one thousand.	260
	8. Write the number that comes before and after a given number through thousands.	262
	9. Supply the missing numbers in a sequence of numbers that are multiples of 5 or 10.	266
F. Zero	F. To develop an understanding of zero, the student will be able to:	
	**1. Recognize zero as the cardinal number of the empty set.	274

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**2. Use zero as the identity element in addition.	275
G. Symbols	G. To develop an understanding of mathematical symbols, the student will be able to:	
	***1. Identify and use the symbols +, -, =.	294
	2. Supply the operation sign for a number sentence.	295
	**3. Recognize the symbols for greater than and less than.	296
	**4. Compare the numbers zero through ninety-nine using greater than and less than.	296
	5. Apply the following mathematical symbols correctly: >, <, =, +, -, ÷, x, ≠.	298
III. Whole Number Operations		
A. Addition	A. To develop an understanding of numbers, the student will be able to:	
	**1. Identify parts of an addition problem.	329

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	2. Give basic addition facts in rapid response drill, written and oral (1-10).	333
	***3. Add basic facts (sums to 18).	335
	***4. Add three one-digit numbers (0-9).	337
	**5. Add four one-digit numbers.	346
	***6. Add a two-digit number and a one-digit number (no regrouping).	338
	**7. Compute sums to ninety-nine with zero in one of the two addends.	340
	***8. Add two two-digit numbers (no regrouping).	341
	**9. Add columns of two-digit numbers (no regrouping).	344
	10. Give basic addition facts in rapid response drill, written and oral (1-20).	343
	*11. Add a three-digit number and a one-digit number (no regrouping).	345

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*12. Add a three-digit number and a two-digit number (no regrouping).	345
	*13. Add a three-digit number and a three-digit number (no regrouping).	345
	*14. Add a two-digit number and a one-digit number, regrouping in ones place only.	347
	*15. Add a two-digit number and a two-digit number, regrouping in ones place only.	347
	*16. Add a three-digit number and a two-digit number, regrouping in ones place only.	347
	*17. Add a three-digit number and a two-digit number, regrouping in ones place only.	347
	*18. Add two three-digit numbers, regrouping in ones place only.	347
	*19. Add three two-digit numbers, regrouping in ones place only.	347
	20. Add two two-digit numbers, regrouping in tens place only.	348

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	21. Add a three-digit number and a two-digit number, regrouping in tens place only.	349
	22. Add two three-digit numbers, regrouping in tens place only.	350
	23. Add a three-digit number and a two-digit number with regrouping.	351
	24. Add two three-digit numbers and a two-digit number regrouping in tens place only.	350
	25. Check sums by adding in reverse order.	342
	26. Solve word problems involving the addition facts.	710
B. Subtraction	B. To develop an understanding of subtraction of numbers, the student will be able to:	
	**1. Identify the parts of a subtraction problem (minuend-subtrahend-difference/remainder).	358
	***2. Demonstrate a knowledge of subtraction facts (minuends to 10).	359

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**3. Subtract a one-digit number from a two-digit number (minuends to 18) using concrete objects and basic facts.	360
	**4. Compute differences to ninety-nine with zero in the subtrahend.	361
	***5. Subtract a one-digit number from a two-digit number (no regrouping).	362
	***6. Subtract a two-digit number from a two-digit number (no regrouping).	362
	***7. Subtract a one-digit number from a three-digit number (no regrouping).	366
	***8. Subtract a two-digit number from a three-digit number (no regrouping).	366
	***9. Subtract a three-digit number from a three-digit number (no regrouping).	336
	*10. Subtract a one-digit number from a two-digit number (regrouping).	337
	*11. Subtract a two-digit number from a two-digit number (regrouping).	337
	*12. Check subtraction by addition.	363
	13. Identify addition and subtraction as inverse operations.	364

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***14. Write number sentences for pictured action.	710
	***15. Supply the answer to an oral addition or subtraction problem (1-10).	710
	**16. Solve word problems using addition and subtraction (sums and minuends less than 100).	710
	**17. Choose the addition or subtraction sentence to solve word problems with sums or minuends to 18.	710
	18. Solve word problems involving subtraction of whole numbers.	710
IV. Fractions and Operations		
A. Fractional Parts	A. To develop an understanding of fractions, the student will be able to:	
	***1. Recognize one-half, one-third, and one-fourth of a concrete object.	420
	***2. Identify the fractions one-half, one-third, and one-fourth.	421
	*3. Read and write the symbol for the fractional part of a region (1/2, 1/3, 1/4).	423

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*4. Shade in fractional part (1/2, 1/3, 1/4) of a given figure.	424
	5. Recognize two-thirds, two-fourths, and three-fourths.	425
V. Relations and Functions		
A. Graphs	A. To develop an understanding of graphs, the student will be able to:	
	1. Make and interpret a bar graph.	565
	2. Record data from a bar graph.	566
	3. Introduce data presented in pictorial form.	568
VI. Measurement and Estimation		
A. Time	A. To develop an understanding of time, the student will be able to:	
	***1. Relate concepts of time to events (morning, noon, night).	587
	***2. Name the days of the week and months of the year.	585
	**3. Use the calendar to determine designated information.	589

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	4. Sequence order of events.	586
	5. Relate concept of time to events.	587
	***6. Identify the hour and minute hand on the clock.	588
	***7. Tell time on the hour.	588
	**8. Tell time on the half hour.	588
	9. Tell time on the quarter hour.	593
	*10. Record time (limit to hour and half-hour, using colon notation, e.g., 12:30).	591
	*11. Tell time to the nearest five minute interval.	594
	*12. Tell time to the nearest minute.	595
	13. Solve 2-step word problems involving time in hours and minutes.	710
B. Money	B. To develop an understanding of money, the student will be able to:	
	***1. Identify the ¢ symbol.	599
	***2. Associate the ¢ symbol with the value of cent, nickel, dime, quarter, and half-dollar.	599

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**3. Recognize the monetary value of cent, nickel, dime, and quarter.	599
	4. Write the value of money using the dollar sign and decimal point.	600
	*5. Solve word problems using money involving cent, nickel, dime, quarter, and half-dollar to dollar.	710
C. Linear Measure - Customary and Metric	C. To promote the understanding of linear measure of metric and customary system, the student will be able to:	
	**1. Identify the centimeter and meter as units of metric (SI) linear measure.	606
	**2. Measure lengths using centimeters.	608
	*3. Measure lengths using the meter.	609
	***4. Identify the inch and the foot as units of customary linear measure.	605
	5. Measure using the inch and foot on a ruler.	605

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*6. Measure lengths to the nearest inch.	607
	7. Measure lengths to inches, feet and yards.	610
D. Liquid Measure - Customary and Metric	D. To promote the understanding of liquid measure, the student will be able to:	
	**1. Recognize the cup, pint, and quart as units of customary liquid measure.	618
	2. Recognize liter as a unit of metric measure.	618
	3. Measure liquids to nearest cup, pint, quart, half-gallon, and gallon.	619
	4. Make conversion between pints and quarts.	620
	5. Recognize gallons as customary liquid measure.	618
	6. Make conversion between quarts and gallons.	620
	*7. Measure volume in liters.	621
E. Weight (mass) - Customary	E. To promote the understanding of measure of weight, the student will be able to:	

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	1. Measure weight in pounds.	613
	2. Measure weight in ounces.	614
	3. Solve word problems involving weight in units of pounds or ounces only (no conversion).	710
VII. Geometry		
A. Shapes	A. To develop an understanding of shapes, the student will be able to:	
	1. Recognize a sphere, prism, cylinder, cone.	644
B. Simple Closed Figures	B. To develop an understanding of simple closed figures, the student will be able to:	
	**1. Identify and associate the words circle, triangle, square, and rectangle with their visual representation.	648
	2. Distinguish between inside and outside of a simple closed figure.	642
	3. Recognize paths as straight, open and closed.	647

COURSE CONTENT

Second Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*4. Draw a facsimile of a circle, triangle, square, and rectangle.	649
	5. Identify and draw representations of points, lines, segments, and rays.	650
C. Perimeter and Area	C. To develop an understanding of perimeter and area, the student will be able to:	
	1. Find the perimeter of a triangle, square and rectangle by counting units.	674
	2. Find the area of a shape by counting the square units that will cover a given model.	680

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
I. Numeration		
A. Place Value	A. To develop an understanding of place value, the student will be able to:	
	***1. Recognize place value through hundreds.	287
	*2. Recognize place value through thousands.	287
	3. Recognize place value through hundred thousands.	283
B. Reading and Writing Numbers	B. To develop an understanding of reading and writing numbers, the student will be able to:	
	***1. Write to one hundred by twos.	271
	***2. Read and write numbers through one thousand.	282
	*3. Read and write numbers through ten thousand.	282
	4. Read and write numbers through one hundred thousand.	283
	5. Write standard numerals in expanded notation.	283
	6. Write expanded form in standard numerals.	292

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
C. Number Words	C. To develop an understanding of number words, the student will be able to:	
	***1. Identify number words eleven through nineteen.	284
	***2. Identify number words for multiples of ten (20-90).	285
	3. Write word names for numbers through thousands place.	286
D. Ordinal Numbers	D. To develop the concept of ordinal numbers, the student will be able to:	
	***1. Use ordinal numbers through nineteenth.	278
	*2. Use ordinal numbers through ninety-ninth.	280
	3. Write the ordinal number for the cardinal number through one hundred.	281
E. Number Sequence	E. To develop an understanding of numbers in sequence, the student will be able to:	
	***1. Supply missing numbers in a sequence (1-100).	260
	***2. Write the number that comes before and after a given number (1-99).	262

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	3. Recognize and write even and odd numbers in sequence (1-100).	263
	***4. Supply the missing numbers in a sequence of odd or even numbers (0-99).	264
	*5. Supply the missing numbers in a sequence through one thousand.	260
	6. Write the number that comes before (after) a given number through thousands.	262
	*7. Supply the missing numbers in a sequence of odd and even numbers (0-1000).	265
	*8. Supply the missing numbers in a sequence of numbers that are multiples of 5 or 10 (limit: 100).	266
	*9. Supply the missing numbers in a sequence through ten thousand.	267
	10. Supply the missing numbers in a sequence of numbers through one hundred thousand.	267
F. Zero and One	F. To develop an understanding of zero, the student will be able to:	

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***1. Recognize zero as the cardinal number of the empty set.	274
	***2. Use zero as the identity element in addition.	275
	*3. Use one as the identity element in multiplication.	276
G. Symbols	G. To develop an understanding of mathematical symbols, the student will be able to:	
	1. Supply the operation sign for a number sentence.	295
	***2. Compare the numbers zero through ninety-nine using greater than and less than.	296
	**3. Recognize the symbols for greater than and less than.	296
	4. State which of the two numbers is greater.	297
	*5. Apply the following mathematical symbols correctly: >, <, =, +, ÷, x, -, ≠.	298
	6. State which of a given set of equalities or inequalities is true.	297

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
II. Whole Number Operations		
A. Addition	A. In order to exhibit an understanding of addition, the student will be able to:	
	***1. Identify parts of an addition problem (addends and sum).	329
	2. Give basic addition facts in rapid response drill, written and orally (1-20).	343
	***3. Add four one-digit numbers.	346
	***4. Compute sums to ninety-nine with zero in one of the two addends.	340
	***5. Add columns of two-digit numbers (no regrouping).	344
	***6. Add a three-digit number and a one-digit number (no regrouping).	345
	***7. Add a three-digit number and a two-digit number (no regrouping).	345
	***8. Add a three-digit number and a three-digit number (no regrouping).	345
	***9. Add a two-digit number and a one-digit number, regrouping in ones place only.	347

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***10. Add a two-digit number and a two-digit number, regrouping in ones place only.	347
	***11. Add a three-digit number and a one-digit number, regrouping in ones place only.	347
	***12. Add a three-digit number and a two-digit number, regrouping in ones place only.	347
	***13. Add two three-digit numbers, regrouping in ones place only.	347
	***14. Add three two-digit numbers, regrouping in ones place only.	347
	*15. Add two two-digit numbers, regrouping in tens place only.	348
	*16. Add a three-digit number and a two-digit number, regrouping in tens place only.	349
	*17. Add two three-digit numbers, regrouping in tens place only.	350
	*18. Add a three-digit number and a two-digit number (regrouping).	351
	19. Add two three-digit numbers and a two-digit number, regrouping in tens place only.	350

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	20. Add a three-digit number and a three-digit number with regrouping.	351
	21. Add three three-digit numbers with regrouping.	351
	22. Add two four-digit numbers with regrouping.	351
	23. Add two five-digit numbers with regrouping.	351
	24. Check computation by reverse addition.	342
	25. Solve word problems involving the addition of three numbers.	710
B. Subtraction	B. To demonstrate a proficiency in subtraction, the student will be able to:	
	***1. Identify the minuend, subtrahend, and difference/remainder* in subtraction.	358
	2. Recall basic subtraction facts in rapid response drill, written and orally (minuends to 10).	365
	***3. Subtract a one-digit number from a two-digit number (minuends to 18) using concrete objects and basic facts.	360

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***4. Compute differences to ninety-nine with zero in the subtrahend.	361
	***5. Subtract a one-digit number from a two-digit number (regrouping).	367
	***6. Subtract a two-digit number from a two-digit number (regrouping).	367
	*7. Subtract a one-digit number from a three-digit number (regrouping ones).	368
	*8. Subtract a one-digit number from a three-digit number (regrouping).	368
	9. Subtract a two-digit number from a three-digit number (regrouping ones).	368
	*10. Subtract a two-digit number from a three-digit number with regrouping.	369
	*11. Subtract a three-digit number from a three-digit number (regrouping ones).	368
	*12. Subtract a three-digit number from a three-digit number (regrouping).	369
	*13. Subtract a one-digit number from a four-digit number (regrouping).	368
	*14. Subtract a two-digit number from a four-digit number (regrouping).	369

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*15. Subtract a three-digit number from a four-digit number (regrouping).	369
	16. Subtract a four-digit number from a four-digit number with regrouping.	369
	**17. Check subtraction by addition.	363
	18. Identify addition and subtraction as inverse operations.	364
	***19. Solve word problems using addition and subtraction (sums and minuends less than 100).	710
	***20. Choose the addition or subtraction sentence to solve word problems with sums or minuends to 18.	710
	21. Solve word problems involving subtraction of whole numbers.	710
C. Multiplication	C. To demonstrate a proficiency in multiplication, the student will be able to:	
	1. Use repeated addition to show relationship of addition and multiplication.	372
	*2. Identify parts of a multiplication problem (multiplicand, multiplier (factors) and product.)	373

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	3. Recall basic multiplication facts in rapid response drill, written and orally.	374
	***4. Multiply two one-digit numbers (products to 36).	374
	*5. Multiply two one-digit numbers (products through 81).	374
	*6. Multiply a two- or three-digit number by a one-digit number (no regrouping).	375
	*7. Multiply a two-digit number by a one-digit number (no digit greater than 6).	376
	8. Check multiplication by reversing factors and re-multiplying.	377
	***9. Solve word problems using multiplication with no factor greater than 6.	710
	*10. Solve two-step word problems using addition, subtraction and/or multiplication.	710
D. Division	D. To promote an understanding of division, the student will be able to:	

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	1. Use repeated subtraction to show relationship of subtraction and division.	388
	2. Use multiplication facts to develop division facts.	389
	*3. Identify the divisor, dividend, quotient, and remainder of a division problem.	391
	*4. Demonstrate a knowledge of division (divisors less than 6).	392
	*5. Recognize numbers divisible by 5.	394
	6. Divide a one-digit number by a one-digit number (with remainder).	398
	7. Divide a two-digit number by a one-digit number (no remainder).	399
	8. Divide a two-digit number by a one-digit number (with remainder).	400
	9. Check computation by multiplication and addition.	401
III. Fractions and Operations		
A. Fractional Parts	A. To develop an understanding of fractional parts, the student will be able to:	

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***1. Read and write the symbol for the fractional part of a region (1/2, 1/3, 1/4).	423
	***2. Shade in fractional parts 1/2, 1/3, 1/4 of a given figure.	424
	3. Recognize 2/3, 2/4, 3/4.	425
	*4. Identify the fractional part of 1/5 and 1/6 of a whole.	426
	*5. Identify and give the meaning of denominator and numerator.	428
	6. Identify fractional part 1/8, 1/10 of a whole.	426
	7. Write mixed number for shaded part of a region.	429
	8. Find fractional part of whole number using a model.	430
B. Comparing Fractions	B. To develop an understanding of fractions, the student will be able to:	
	1. Compare fractions with like denominators with the aid of a model.	431
	2. Write equivalent fractions working from a model.	432

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	3. Solve word problems using like fractions.	710
IV. Relations and Functions		
A. Graphs	A. To develop an understanding of graphs, the student will be able to:	
	1. Make and interpret a bar graph.	565
	2. Record data from a bar graph.	566
	**3. Interpret data presented in pictorial form.	568
V. Measurement and Estimation		
A. Time	A. To promote an understanding of time, the student will be able to:	
	1. Relate concept of time to events.	587
	***2. Use the calendar to determine designated information.	589
	***3. Tell time on the half hour.	588
	4. Tell time on the quarter hour.	593
	*5. Tell time to nearest five minute interval.	594
	*6. Tell time to the nearest minute.	595

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***7. Record time using colon notation (designate a.m. or p.m.).	591
	*8. Solve word problems involving time in hours only and in minutes only.	710
	*9. Solve word problems involving time in days, weeks, months or years (no conversion).	710
	10. Solve two-step word problems involving time in hours only and minutes only.	710
B. Money	B. To promote an understanding of using money, the student will be able to:	
	***1. Recognize the monetary values of cents, nickel, dime and quarter.	599
	*2. Write the value of money using the dollar sign and decimal point.	600
	*3. Count change to $1.00.	601
	4. Add and subtract dollars and cents.	602
	5. Solve problems using money involving cent, nickel, dime, quarter and half-dollar to dollar.	710

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*6. Solve two-step word problems involving amounts of money not to exceed ten dollars.	710
C. Linear Measure - Customary and Metric	C. To promote the understanding of linear measure using metric and customary system, the student will be able to:	
	1. Measure using the inch and foot on a ruler.	605
	***2. Identify the centimeter and meter as units of metric length.	606
	***3. Measure lengths using centimeters.	608
	**4. Measure lengths using the meter.	609
	***5. Measure a length to the nearest inch.	607
	*6. Measure a length to the nearest half-inch, foot, and yard.	607
	7. Measure length in inches, feet and yards.	610
D. Liquid Measure - Customary and Metric	D. To promote the understanding of liquid measure, both customary and metric, the student will be able to:	
	***1. Recognize the cup, pint, quart, and gallon as units of liquid measures.	618

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	2. Recognize the liter as metric measure of liquid measure.	618
	***3. Measure liquids to the nearest cup, pint, quart, half-gallon and gallon.	619
	4. Make conversions among pints and quarts.	620
	5. Recognize gallons as customary liquid measure.	618
	6. Make conversions between quarts and gallons.	620
	**7. Measure volume in liters.	621
	8. Make conversion of one-fourth liter, and one-half liter to liter.	622
E. Weight (mass) - Customary and Metric	E. To promote an understanding of weight (mass) measure using metric and customary systems, the student will be able to:	
	***1. Measure weight in pounds.	613
	*2. Measure weight in ounces.	614
	*3. Measure weight in grams and kilograms.	615

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*4. Solve word problems involving weight, units pounds and ounces only (no conversion).	710
	5. Solve word problems involving grams and/or kilograms (no conversions).	710
F. Thermometer - Customary and Metric	F. To promote an understanding of the thermometer, both customary and metric, the student will be able to:	
	*1. Read a Celsius thermometer.	617
	*2. Read a Fahrenheit thermometer.	617
VI. Geometry		
A. Shapes and Figures	A. To develop an understanding of shapes, the student will be able to:	
	1. Recognize a sphere, prism, cylinder, cone.	644
	2. Identify common spatial figures (cube, pyramid, etc.)	703
B. Simple Closed Figures	B. To promote an understanding of simple closed figures, the student will be able to:	
	***1. Identify and associate the words circle, triangle, square, and rectangle with their visual representation.	648

COURSE CONTENT

Third Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***2. Draw a facsimile of a circle, triangle, square, rectangle.	649
	3. Distinguish between inside and outside of a simple closed figure.	642
	4. Recognize paths as straight, open or closed.	647
	*5. Identify and draw representations of points, lines, segments and rays.	650
C. Perimeter, Area and Volume	C. To develop an understanding of perimeter, area and volume, the student will be able to:	
	1. Find the perimeter of a triangle, square, and rectangle by counting units.	674
	2. Find the area of a shape by counting the square units that will cover a given model.	680
	3. Find the volume of a shape by counting the cubic units that will fit inside.	687

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
I. Numeration		
A. Place Value	A. To develop an understanding of place value, the student will be able to:	
	***1. Recognize place value through thousands.	287
	*2. Recognize place value through hundred thousands.	287
	3. Recognize place value through millions.	283
	4. Recognize place value to hundred millions.	283
B. Reading and Writing Numbers	B. To develop an understanding of reading and writing numbers, the student will be able to:	
	***1. Read and write numbers through ten thousand.	282
	*2. Read and write numbers through one hundred thousand.	282
	3. Read and write numbers through one million.	283
	4. Write standard numerals in expanded notation.	283

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	5. Write expanded form in standard numerals.	292
C. Number Words	C. To develop an understanding of number words, the student will be able to:	
	*1. Read and write word names for numbers through thousands place.	286
	2. Read and write word names for numbers through ten thousands place.	286
	3. Read and write word names for numbers through hundred thousands place.	286
D. Ordinal Numbers	D. To develop the concept of ordinal numbers, the student will be able to:	
	***1. Identify ordinal numbers through ninety-ninth.	280
	2. Write the ordinal numbers for the cardinal numbers through one hundred.	281
E. Number Sequence	E. To develop an understanding of numbers in sequence, the student will be able to:	
	***1. Supply the missing numbers in a sequence through thousands.	260
	2. Write the number that comes before and after a given number through thousands.	262

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***3. Supply the missing numbers in a sequence of odd and even numbers (0-1000).	265
	***4. Supply the missing numbers in a sequence of numbers that are multiples of 5 or 10.	266
	***5. Supply the missing numbers in a sequence of numbers through ten thousand.	267
	*6. Supply the missing numbers in a sequence of numbers through one hundred thousand.	267
	7. Supply the missing numbers in a sequence of numbers through millions.	267
F. Symbols (Equalities and Inequalities)	F. To develop an understanding of mathematical symbols, the student will be able to:	
	***1. Use one as the identity element in multiplication.	276
	***2. Recognize the symbols for greater than and less than.	296
	3. State which of two numbers is greater.	297

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***4. Apply the following mathematical symbols correctly: >, < , =, +, x, ÷, -, ≠.	298
	5. State which of a given set of equalities or inequalities is true.	297
	6. Write inequalities.	297
	*7. Determine the equality relationship between given groups of numbers (>, =, <).	299
G. Roman Numerals	G. To develop a further understanding of Roman numerals, the student will be able to:	
	1. Express the following Roman numerals as Arabic numerals: I, V, X, L, C, D, and M.	300
	2. Identify and read Roman numerals for one through three hundred.	300
H. Rounding Numbers	H. To develop an understanding of rounding numbers, the student will be able to:	
	*1. Round numbers to the nearest ten.	303
	2. Round numbers to nearest one hundred.	303
	3. Round numbers to nearest one thousand.	303

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
II. Whole Number Operations		
A. Addition	A. To demonstrate a knowledge of addition, the student will be able to:	
	1. Give basic additional facts in rapid response drill, written or orally.	343
	***2. Add two two-digit numbers, regrouping in tens place only.	348
	***3. Add a three-digit number and a two-digit number, regrouping in tens place only.	349
	4. Add two three-digit numbers and a two-digit number, regrouping in tens place only.	350
	***5. Add two three-digit numbers, regrouping in tens place only.	350
	***6. Add a three-digit number and a two-digit number (regrouping).	351
	**7. Add two three-digit numbers (regrouping).	351
	**8. Add three three-digit numbers (regrouping).	351
	**9. Add two four-digit numbers (regrouping).	351

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**10. Add two five-digit numbers (regrouping).	351
	11. Check addition by reverse adding.	342
	12. Solve word problems involving the addition of three numbers.	710
B. Subtraction	B. To develop an understanding of subtraction, the student will be able to:	
	1. Recall basic subtraction facts in rapid response drill, written or orally.	365
	**2. Subtract a one-digit number from a three-digit number (regrouping ones).	368
	**3. Subtract a one-digit number from a three-digit number (regrouping).	368
	4. Subtract a two-digit number from a three-digit number (regrouping ones).	368
	**5. Subtract a two-digit number from a three-digit number (regrouping).	369
	**6. Subtract a three-digit number from a three-digit number (regrouping ones).	368
	**7. Subtract a three-digit number from a three-digit number (regrouping).	369
	**8. Subtract a one-digit number from a four-digit number (regrouping).	368

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**9. Subtract a two-digit number from a four-digit number (regrouping).	369
	**10. Subtract a three-digit number from a four-digit number (regrouping).	369
	11. Subtract a four-digit number from a four-digit number (regrouping).	369
	***12. Check subtraction by addition.	363
	13. Identify addition and subtraction as inverse operations.	364
	14. Solve word problems involving subtraction of whole numbers.	710
C. Multiplication	C. To develop an understanding of multiplication, the student will be able to:	
	1. Use repeated addition to show relationship of addition and multiplication.	372
	***2. Identify parts of a multiplication problem (multiplicand, multiplier, factors, and product).	373
	3. Recall basic multiplication facts in rapid response drill, written or orally.	374

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***4. Multiply two one-digit numbers (products to 81).	374
	***5. Multiply a two- or three-digit number by a one-digit number (no regrouping).	375
	***6. Multiply a two-digit number by a one-digit number with no digit greater than 6.	376
	*7. Multiply a two-digit number by a one-digit number.	376
	8. Multiply by ten and one hundred.	379
	*9. Multiply a three-digit number by a one-digit number.	381
	*10. Multiply a two-digit number by a two-digit number.	381
	*11. Multiply a three-digit number by a two-digit number.	381
	*12. Multiply by ten; one hundred; one thousand.	385
	13. Check multiplication by reverse multiplication and division.	377
	14. Solve word problems involving multiplication of whole numbers.	710

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**15. Solve two-step problems using addition, subtraction and/or multiplication.	710
D. Division	D. To develop an understanding of division, the student will be able to:	
	1. Use repeated subtraction to show the relationship of subtraction and division.	388
	2. Use multiplication facts to develop division facts.	390
	**3. Identify the parts of a division problem.	391
	***4. Demonstrate a knowledge of division facts (divisors of 6 or less).	392
	**5. Recognize numbers divisible by 5.	394
	*6. Recognize that division by 0 is not possible.	395
	7. Use divisibility rules to determine if a number is divisible by 2, 3, 4, 5, 6, 9, 10.	396
	*8. Divide a one-digit number by a one-digit number with a remainder.	398

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*9. Divide a two-digit number by a one-digit number (with remainder).	400
	*10. Divide a two-digit number by a one-digit number (no remainder).	399
	11. Divide a two-digit number by a two-digit number with remainder.	400
	**12. Check computation by multiplication and addition in division.	401
	*13. Divide a three-digit number by a one-digit number (no remainder).	399
	*14. Divide a four-digit number by a one-digit number (no remainder).	399
	*15. Divide a three-digit number by a one-digit number with remainder.	402
	*16. Divide a four-digit number by a one-digit number with remainder.	402
	17. Divide by a multiple of ten.	403
	18. Divide a two-digit number by a two-digit number (no remainder).	405
	19. Divide a three-digit number by a two-digit number (no remainder).	405

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	20. Solve word problems using division of whole numbers.	710
	21. Solve two-step word problems using all operations on whole numbers.	710
III. Fractions		
A. Fractional Parts	A. To develop an understanding of fractions, the student will be able to:	
	***1. Identify the fractional part (1/5, 1/6) of a whole.	426
	**2. Identify the fractional part (1/8, 1/10) of a whole.	426
	***3. Identify and give the meaning of denominator and numerator.	428
	4. Write a mixed number of the shaded part of a region.	429
	5. Find fractional part of a whole number using a model.	430
	6. Compare fractions with like denominators with the aid of a model.	431
	7. Write equivalent fractions working from a model.	432

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
B. Fraction Operations	B. To develop an understanding of fraction operations, the student will be able to:	
	1. Identify and write equivalent fractional numbers.	433
	*2. Add two simple fractions with like denominators (no regrouping).	436
	*3. Subtract two simple fractions with like denominators (no regrouping).	438
	*4. Identify proper, improper, and mixed fractions.	439
	*5. Add mixed numbers with like denominators (no regrouping, no renaming in the sum).	441
	*6. Subtract mixed numbers with like denominators (no regrouping, no renaming in the difference).	443
	7. Find the fractional part of a whole number.	445
	8. Solve word problems using like fractions.	710
	9. Solve word problems using addition of fractions.	710

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	10. Solve word problems using subtraction of fractions.	710
	11. Solve word problems using subtraction and addition of fractions.	710
IV. Decimals and Decimal Operations		
A. Decimal Fractions	A. To develop an understanding of decimal fractions, the student will be able to:	
	*1. Read and write decimals through hundredths.	485
	2. Read and write decimals through thousandths.	485
	*3. Identify decimals equivalent to 1/2, 1/4, 3/4, 1/5, 4/5, 1/10, 9/10, 1/100, 99/100.	489
	*4. Add decimals through hundredths.	501
	*5. Subtract decimals through hundredths.	503
	6. Solve word problems using addition and subtraction of decimals.	710
	7. Order decimals (limit hundredths).	496

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
V. Percent, Ratio and Proportion		
A. Percent	A. To develop an understanding of percent, the student will be able to:	
	*1. Identify the percent sign.	524
VI. Relations and Functions		
A. Graphs	A. To develop an understanding of graphs, the student will be able to:	
	1. Make and interpret a bar graph.	565
	2. Record data from a bar graph.	566
	***3. Interpret data presented in pictorial form.	568
	*4. Interpret simple data from a simple bar graph.	570
	*5. Interpret data from a simple line graph, pictograph, or circle graph.	570
VII. Measurement and Estimation		
A. Time	A. To develop the concept of time, the student will be able to:	
	1. Tell time on the quarter hour.	593

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	2. Record time.	592
	**3. Tell time to the nearest five minute interval.	594
	**4. Tell time to the nearest minute.	595
	**5. Solve word problems involving time in hours and in minutes only.	710
	**6. Solve word problems involving time in days, weeks, months, or years (no conversion).	710
	7. Solve two-step word problems involving time in hours only and minutes only.	710
B. Money	B. To develop an understanding of money, the student will be able to:	
	***1. Write the value of money using the $ and the decimal point.	600
	***2. Count change to $1.00.	601
	3. Add and subtract dollars and cents.	602
	4. Count change to $5.00, $10.00.	601

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	5. Solve problems using money involving cent, nickel, dime, quarter, and half-dollar to one dollar.	710
	**6. Solve two-step word problems involving amounts of money not to exceed ten dollars.	710
C. Linear Measure - Customary and Metric	C. To develop the concept of linear measure, both metric and customary, the student will be able to:	
	***1. Measure lengths using the meter.	609
	***2. Measure a length to the hearest half-inch, foot, and yard.	607
	3. Measure lengths in inches, feet, and yards.	610
	4. Measure a length to the nearest 1/4 and/or 1/8 inch.	607
	*5. Determine the appropriate unit to measure length in metric and customary.	612
D. Liquid Measure - Customary and Metric	D. To promote the understanding of liquid measure of metric and customary systems, the student will be able to:	
	1. Make conversions among pints and quarts.	620

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	2. Make conversions between quarts and gallons.	620
	***3. Measure volume in liters.	621
	*4. Determine the appropriate unit to measure capacity (liquids) in metric and customary.	623
E. Weight (mass) - Customary and Metric	E. To promote an understanding of weight (mass) measure of metric and customary system, the student will be able to:	
	**1. Measure a weight in grams and kilograms.	615
	***2. Measure weight in pounds and ounces.	614
	3. Determine the appropriate unit of measure weight (mass) in the metric and customary system.	616
	***4. Solve word problems involving weight, units of pounds or ounces only (no conversion).	710
	5. Solve word problems involving grams and/or kilograms (no conversions).	710

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
F. Thermometer - Customary and Metric	F. To promote an understanding of the thermometer, customary and metric, the student will be able to:	
	**1. Read a Celsius thermometer.	617
	**2. Read a Fahrenheit thermometer.	617
VIII. Geometry		
A. Geometric Figures	A. To develop an understanding of geometric figures, the student will be able to:	
	***1. Identify and draw representations of points, lines, segments, and rays.	650
	*2. Identify the parts of a circle: center, radius, diameter, circumference, and semicircle.	652
	*3. Identify pairs of intersecting and parallel lines.	656
	*4. Identify horizontal and vertical lines.	657
	5. Identify the sides and vertex of an angle.	659
	*6. Identify an angle, parts of an angle, and a right angle.	661

COURSE CONTENT

Fourth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	7. Identify common spatial figures (cube, pyramid, sphere, etc.)	703
B. Perimeter, Area and Volume	B. To promote an understanding of perimeter, area and volume, the student will be able to:	
	***1. Find the perimeter of a triangle, square, and rectangle by counting units.	674
	*2. Compute the perimeter of a square, rectangle, and triangle.	673
	***3. Find the area of a shape by counting the square units that will cover a given model.	680
	4. Find the volume of a shape by counting the cubic units that will fit inside.	687

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
I. Numeration		
A. Place Value	A. To develop an understanding of place value of numbers the student will be able to:	
	***1. Recognize place value through hundred thousands.	287
	*2. Recognize place value through millions.	283
	3. Recognize place value to hundred millions.	283
	*4. Recognize place value of decimal numbers through thousandths.	288
	5. Identify the value of a digit in numbers through hundred thousandths place.	288
B. Reading and Writing Numbers	B. To develop an understanding of reading and writing numbers, the student will be able to:	
	***1. Read and write numbers through one hundred thousand.	282
	*2. Read and write numbers through one million.	283

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	3. Write standard numerals in expanded notation.	283
	4. Write expanded form in standard numerals.	292
C. Number Words	C. To demonstrate an understanding of number words, the student will be able to:	
	**1. Read and write word names for numbers through thousands place.	286
	**2. Read and write word names for numbers through ten thousands place.	286
	*3. Read and write word names for numbers through hundred thousands place.	286
	4. Read and write word names for numbers through millions.	286
	5. Read and write word names for numbers through billions.	286
D. Number Sequence	D. To demonstrate an understanding of number sequence, the student will be able to:	
	1. Supply the missing numbers in a sequence of numbers through ten thousand.	267

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***2. Supply the missing numbers in a sequence of numbers through one hundred thousand.	267
	*3. Supply the missing numbers in a sequence of numbers through millions.	267
	*4. Supply the missing numbers in a sequence which requires +, -, x, or ÷.	268
	5. Determine the pattern for a given number sequence.	269
E. Symbols (Equalities and Inequalities)	F. To develop an understanding of mathematical symbols, the student will be able to:	
	1. State which of two numbers is greater.	297
	2. State which of a given set of equalities or inequalities is true.	297
	3. Write inequalities.	297
	**4. Determine the equality relationship between given groups of numbers (>, =, <).	299

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
F. Roman Numerals	F. To demonstrate an understanding of Roman numerals, the student will be able to:	
	*1. Read and write Roman numerals (1-39).	300
	2. Express the following Roman numerals as Arabic numerals: I, V, X, L, C, D, and M.	300
	3. Write Roman numerals for standard numerals.	302
	4. Write standard numerals for Roman numerals.	302
	5. Identify and read Roman numerals for one through three hundred.	300
G. Rounding Numbers	G. To facilitate learning of rounding numbers, the student will be able to:	
	1. Round off a given number less than 100 to the nearest 10.	303
	**2. Round numbers to the nearest hundred.	303
	*3. Round numbers to the nearest hundred.	303

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*4. Round numbers to the nearest thousand.	303
H. Prime and Composite Factors	H. To develop an understanding of prime and composite numbers, the student will be able to:	
	*1. Identify prime numbers less than one hundred.	308
	2. Identify composite numbers.	308
	3. Find the possible factors of a number less than one hundred.	309
	4. Find the common factors of two or more numbers less than one hundred.	310
	5. Write a number as the product of prime factors.	312
	6. Find the common multiples of two or more numbers less than thirty.	314
II. Whole Number Operations		
A. Addition	A. To develop an understanding of addition of whole numbers, the student will be able to:	
	***1. Add a three-digit number and a three-digit number with regrouping.	351

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***2. Add three three-digit numbers with regrouping.	351
	***3. Add two four-digit numbers with regrouping.	351
	***4. Add two five-digit numbers with regrouping.	351
	*5. Estimate a sum to the appropriate place value.	353
	6. Add columns of numbers using four- and five-digit numbers.	354
	7. Add whole numbers.	356
B. Subtraction	B. To develop an understanding of subtraction of whole numbers, the student will be able to:	
	1. Recall basic subtraction facts in rapid response drill (minuends to 18), written and oral.	365
	***2. Subtract a one-digit number from a three-digit number, regrouping ones.	368
	3. Subtract a two-digit number from a three-digit number, regrouping ones.	368

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***4. Subtract a two-digit number from a three-digit number with regrouping.	369
	***5. Subtract a three-digit number from a three-digit number, regrouping ones.	368
	***6. Subtract a three-digit number from a three-digit number with regrouping.	369
	***7. Subtract a one-digit number from a a four-digit number with regrouping.	368
	***8. Subtract a two-digit number from a four-digit number with regrouping.	369
	***9. Subtract a three-digit number from a four-digit number with regrouping.	369
	10. Subtract a four-digit number from a a four-digit number with regrouping.	369
	*11. Subtract one number from another (minuends to five digits).	371
	12. Solve word problems involving subtraction of whole numbers.	710
C. Multiplication	C. To demonstrate an understanding of multiplication of whole numbers, the student will be able to:	

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	1. Use repeated addition to show relationship of addition and multiplication.	372
	2. Recall basic multiplication facts in rapid response drill, written and oral.	374
	***3. Multiply a two-digit number by a one-digit number.	376
	4. Check multiplication by reversing factors and multiplying again.	378
	5. Multiply by ten and one hundred.	379
	***6. Multiply a three-digit number by a one-digit number.	381
	*7. Multiply a two-digit number by a two-digit number.	381
	*8. Multiply a three-digit number by a a two-digit number.	381
	9. Check multiplication by division.	383
	*10. Multiply by ten; one hundred; one thousand.	385

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*11. Multiply a three-digit number by a three-digit number.	381
	12. Solve word problems involving multiplication of whole numbers.	710
	***13. Solve two-step word problems using addition, subtraction and/or multiplication.	710
	14. Estimate products.	414
D. Division	D. To demonstrate an understanding of division of whole numbers, the student will be able to:	
	1. Use repeated subtraction to show the relationship of subtraction and division.	388
	2. Use multiplication facts to develop division facts.	390
	***3. Identify the parts of a division problem.	391
	***4. Recall basic division facts in rapid response drill, written and oral.	392

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***5. Recognize numbers divisible by 5.	394
	***6. Recognize that division by zero is not possible.	395
	7. Use divisibility rules to determine if a number is divisible by 2, 3, 4, 5, 6, 9, 10.	396
	***8. Divide a one-digit number by a one-digit number with remainder.	398
	***9. Divide a two-digit number by a one-digit number (no remainder).	399
	***10. Divide a two-digit number by a one-digit number with remainder.	400
	**11. Check computation by multiplication and addition in division.	401
	***12. Divide a three-digit number by a three-digit number (no remainder).	402
	***13. Divide a four-digit number by a one-digit number (no remainder).	402
	***14. Divide a three-digit number by a one-digit number (no remainder).	399
	***15. Divide a four-digit number by a one-digit number with remainder.	402

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*16. Divide by a multiple of ten.	403
	*17. Divide a two-digit number by a two-digit number (no remainder).	405
	*18. Divide a three-digit number by a two-digit number (no remainder).	405
	*19. Divide a four-digit number by a two-digit number (no remainder).	405
	*20. Divide a two-digit number by a two-digit number with remainder.	405
	*21. Divide a three-digit number by a two-digit number with remainder.	405
	*22. Divide a four-digit number by a two-digit number with remainder.	405
	*23. Divide a five-digit number by a two-digit number with remainder.	405
	*24. Express remainders as fractions.	407
	25. Estimate quotients.	415
	26. Solve word problems using division of whole numbers.	710
	27. Solve two-step word problems using all operations on whole numbers.	710

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	28. Compute the average on not more than five numbers each with a maximum of three digits.	417
III. Fractional Numbers		
A. Fractional Numbers	A. To develop an understanding of fractions, the student will be able to:	
	***1. Identify the fractional parts (1/8, 1/10) of a whole.	426
	2. Write a mixed number for the shaded part of a region.	429
	3. Compare fractions with like denominators with the aid of a model.	431
	4. Write equivalent fractions working from a model.	432
	5. Identify and write equivalent fractional numbers.	433
	**6. Identify proper, improper, and mixed fractions.	439
	*7. Identify the common fraction that represents the shaded area of a grid figure when compared to the total area (2/5, 3/5, 3/8, 5/8, 7/8).	446

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*8. Continue consecutive equivalency pattern of fractions. (Example: 1/2, 2/4, 3/6...)	447
	*9. Determine the greatest common factor (GCF) of numbers.	449
	*10. Rename fractions in simplest terms.	451
	*11. Rename fractions in higher terms.	452
	*12. Rename mixed numbers and/or whole numbers as improper fractions.	453
	*13. Rename improper fractions as mixed numbers and/or whole numbers.	454
	*14. Determine the least common multiple (LCM) of two or more numbers.	456
	*15. Rename fractions with unlike denominators to fractions with like denominators.	457
B. Addition of Fractions	B. To demonstrate a working knowledge of addition of fractions, the student will be able to:	
	***1. Add two simple fractions with like denominators (no regrouping).	436

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***2. Add mixed numbers with like denominators (no regrouping, no renaming in the sum).	441
	*3. Add fractions with like denominators, renaming sums.	458
	4. Solve word problems using like fractions.	710
	*5. Add fractions with unlike denominators.	459
	*6. Add mixed numbers with unlike denominators.	461
	7. Solve word problems using addition of fractions.	710
C. Subtraction of Fractions	C. To demonstrate a working knowledge of subtraction of fractions, the student will be able to:	
	***1. Subtract two simple fractions with like denominators (no regrouping).	438
	***2. Subtract mixed numbers with like denominators (no regrouping, no renaming in the difference).	443
	*3. Subtract fractions with like denominators, renaming difference.	460

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*4. Subtract mixed numbers with like denominators with regrouping.	465
	*5. Subtract fractions with unlike denominators.	462
	*6. Subtract a fraction from a whole number.	464
	*7. Subtract mixed numbers with unlike denominators (no regrouping).	468
	*8. Subtract mixed numbers with unlike denominators with regrouping.	465
	9. Subtract fractions and mixed numbers.	467
	10. Solve word problems using subtraction of fractions.	710
	11. Solve word problems using addition and subtraction of fractions.	710
D. Multiplication of Fractions	D. To demonstrate a working knowledge of multiplication of fractions, the student will be able to:	
	*1. Multiply a whole number by a proper fraction.	469
	*2. Multiply two proper fractions.	470

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*3. Multiply a mixed number by a proper fraction.	471
	*4. Multiply a whole number by a mixed number.	472
	*5. Multiply two mixed numbers.	474
	6. Solve word problems using multiplication of fractions.	710
	7. Solve word problems using addition, subtraction, and/or multiplication of fractions.	710
E. Division of Fractions	E. To demonstrate a working knowledge of division of fractions, the student will be able to:	
	*1. Identify the multiplicative inverse (reciprocal).	475
	*2. Divide a proper fraction by a proper fraction.	475
	*3. Divide a whole number by a proper fraction.	475
	*4. Divide a proper fraction by a whole number.	475

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Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*5. Divide a mixed number by a proper fraction.	477
	*6. Divide a proper fraction by a mixed number.	477
	*7. Divide a mixed number by a mixed number.	478
	8. Name the product in simplest form by using cancellation before multiplying.	480
	9. Divide a mixed number by a whole number.	478
	10. Divide a whole number by a mixed number.	478
	11. Solve word problems using division of fractions and other operations.	710
IV. Decimal and Decimal Operations		
A. Functional Applications of Decimal Fractions	A. To develop a further understanding of decimal fractions, the student will be able to:	
	***1. Read and write decimals through hundredths.	485

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Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**2. Read and write decimals through thousandths.	485
	3. Read and write decimal numeral to millionths.	485
	***4. Identify decimal equivalents to 1/2, 1/4, 3/4, 1/5-4/5, 1/10-9/10, 1/100-99/100.	489
	*5. Identify decimal equivalents to 1/3, 2/5, 1/6-5/6, 1/8-7/8.	492
	6. Write, count and expand decimal fractions.	495
	**7. Write several decimals in order according to size (limit: hundredths).	496
	*8. Write several decimals in order according to size (limit: thousandths).	496
B. Addition, Subtraction and Multiplication of Decimals	B. To develop a further understanding of addition, subtraction, and multiplication of decimal fractions, the student will be able to:	
	***1. Add decimals through hundredths.	501
	*2. Add decimals through thousandths.	501

COURSE CONTENT

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Curriculum Outline	Performance Objectives	Activity Page Number
	3. Find the sum of two or more decimal fractions having the same number of decimal places.	501
	***4. Subtract decimals through hundredths.	503
	*5. Subtract decimals through thousandths.	503
	*6. Multiply a whole number by a decimal.	504
	7. Multiply a decimal by a decimal.	505
	8. Multiply a whole number and .1, .01, .001, and .0001.	507
	9. Multiply a decimal fraction and .1, .01, .001, and .0001.	507
	10. Solve word problems using addition and subtraction of decimals.	710
V. Percent, Ratio and Proportion		
A. Ratio and Proportion	A. To demonstrate a working knowledge of ratio and proportion, the student will be able to:	
	1. Define a ratio.	524
	2. Name a ratio in several ways.	526
	3. Recognize and use ratios in map reading.	529

COURSE CONTENT

Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	4. Define a proportion.	524
	*5. Find a missing term of a proportion.	533
	*6. Express a ratio of two numbers (include the comparison of shaded area to the total area).	528
B. Percent	B. To demonstrate a working knowledge of percent, the student will be able to:	
	***1. Identify the percent sign.	524
	*2. Define percent.	524
	*3. Change a decimal to a percent.	536
	*4. Change a percent to a decimal.	536
	*5. Change common fractions with denominators of 2, 3, 5, 8, 10, 20, 25, 50, and 100 to percent.	537
	*6. Find the percent of a given number.	539
VI. Relations and Functions		
A. Graphs	A. To develop further understanding of graphs, the student will be able to:	
	**1. Interpret simple data from a simple bar graph	570

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Curriculum Outline	Performance Objectives	Activity Page Number
	2. Interpret data from a simple line graph, pictograph, or circle graph.	570
	*3. Construct a bar graph from given data.	574
	4. Construct, read, and interpret bar graphs.	574
VII. Measurements and Estimation		
A. Time	A. To develop the concept of time, the student will be able to:	
	1. Record time - no limit.	592
	***2. Tell time to the nearest five minute interval.	594
	**3. Tell time to the nearest minute.	595
	4. Read time to the nearest minute and compute sums or differences in time problems involving hours.	596
	***5. Solve word problems involving time in hours only and in minutes only.	710
	***6. Solve word problems involving time in days, weeks, months, or years (no conversion).	710

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Curriculum Outline	Performance Objectives	Activity Page Number
	7. Solve word problems involving time in days, weeks, months, or years with conversion.	710
	8. Solve two-step word problems involving time in hours only and minutes only.	710
B. Money	B. To develop an understanding of money, the student will be able to:	
	1. Add and subtract dollars and cents.	602
	2. Count change to $5.00, $10.00.	601
	***3. Solve two-step word problems involving amounts of money not to exceed ten dollars.	710
	4. Solve two-step word problems involving amounts of money.	710
C. Linear Measure	C. To develop the concept of linear measure, metric and customary, the student will be able to	
	1. Measure lengths in inches, feet, and yards.	610
	2. Measure a length to the nearest 1/4 and/or 1/8 inch.	607

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Curriculum Outline	Performance Objectives	Activity Page Number
	3. Measure lengths to the nearest mm.	611
	**4. Determine the appropriate unit to measure length in metric and customary.	612
D. Liquid Measure	D. To develop the understanding of liquid measure, metric and customary, the student will be able to:	
	*1. Convert milliliters to liters; liters to milliliters.	611
	**2. Determine the appropriate unit to measure capacity (liquids) in metric and customary.	623
	3. Measure capacity in liters and milliliters.	611
E. Weight (mass)	E. To promote the understanding of liquid measure, metric and customary, the student will be able to:	
	***1. Measure a weight (mass) in grams and kilograms.	615
	*2. Determine the appropriate unit to measure weight (mass) in metric and customary.	616

Curriculum Outline	Performance Objectives	Activity Page Number
F. Thermometer	F. To promote the understanding of the thermometer, metric and customary, the student will be able to:	
	**1. Read a Celsius thermometer.	617
	**2. Read a Fahrenheit thermometer.	617
G. Symbols and Conversions	G. To develop an understanding of conversions and symbols, the student will be able to:	
	1. Recognize abbreviations and value of the common units of measurement in the customary system.	625
	2. Recognize the symbols and the value of the common units of measurement in the metric system.	627
	*3. Convert linear, square, capacity, and weight measurements to equivalent measures within the metric system.	630
	*4. Convert linear, square, capacity, and weight measurements to equivalent measures within the customary system.	632
VIII. Geometry		
A. Lines	A. To demonstrate an understanding of lines, the student will be able to:	

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Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**1. Identify pairs of intersecting and parallel lines.	656
	**2. Identify horizontal and vertical lines.	657
B. Angles	B. To demonstrate an understanding of angles, the student will be able to:	
	1. Identify the sides and vertex of an angle.	659
	**2. Identify an angle, parts of an angle, and a right angle.	661
	3. Draw an angle and label the vertex and sides.	659
	*4. Measure an angle using a protractor.	663
C. Figures	C. To develop an understanding of geometric figures, the student will be able to:	
	1. Construct and label points, lines, segments, rays, angles, and planes.	670
	2. Recognize congruent figures.	671
	**3. Identify common spatial figures (cube, pyramid, sphere, rectangular, prism, cone, cylinder).	703

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Curriculum Outline	Performance Objectives	Activity Page Number
D. Circles	D. To develop an understanding of circles, the student will be able:	
	***1. Identify the parts of a circle: center, radius, diameter, circumference, and semicircle.	652
	2. Identify the parts of a circle: center, radius, chord, diameter, circumference, arc, semicircle.	654
	*3. Recognize and use π in fraction (22/7) or decimal (3.14) form.	679
E. Perimeter, Area, Circumference and Volume	E. To develop an understanding of perimeter, area, circumference, and volume, the student will be able to:	
	***1. Compute the perimeter of a square, rectangle, and triangle.	673
	*2. Compute the area of a square and a rectangle using the appropriate formula.	681
	3. Compute the circumference of a circle by using the appropriate formula.	679
	4. Identify the altitude and base of a triangle and parallelogram.	687

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Fifth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	5. Find the volume of a shape by counting the cubic units that will fit inside	687
	*6. Compute the volume of a cube and a rectangular prism.	688

COURSE CONTENT

Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
I. Numeration		
A. Place Value	A. To develop an understanding of place value, the student will be able to:	
	***1. Recognize place value through millions.	283
	2. Recognize place value to hundred millions.	283
	**3. Recognize place value of decimal numbers through thousandths.	288
	4. Identify the value of a digit in numbers through hundred thousandths place.	288
	5. State and write the place, face and total value of base ten numbers through billions.	289
B. Reading and Writing Numbers	B. To develop an understanding of reading and writing numbers, the student will be able to:	
	***1. Read and write numbers through one million.	283
	2. Write standard numerals in expanded notation.	283

COURSE CONTENT

Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	3. Write expanded form in standard numerals.	292
	4. Write a standard number in expanded form using exponential notation.	293
	*5. Find the value of an expression such as 4^3.	292
C. Number Word	C. To demonstrate an understanding of number words, the student will be able to:	
	***1. Read and write number words through one thousand.	286
	**2. Read and write number words through ten thousands place.	286
	**3. Read and write number words through hundred thousands place.	286
	**4. Read and write number words through millions.	286
	5. Read and write number words through billions.	286
D. Number Sequence	D. To demonstrate an understanding of number sequence, the student will be able to:	
	***1. Supply the missing numbers in a sequence of numbers through one million.	267

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Curriculum Outline	Performance Objectives	Activity Page Number
	*2. Supply the missing numbers in a sequence which requires +, -, x, or ÷ .	268
	3. Determine the pattern for a given number sequence.	269
E. Symbols (Equalities and Inequalities)	E. To develop an understanding of mathematical symbols, the student will be able to:	
	1. State which of a given set of equalities or inequalities is true.	297
	2. Write inequalities.	297
	***3. Determine the equality relationship between given groups of numbers (>, =, <).	299
F. Roman Numerals	F. To demonstrate an understanding of Roman numerals, the student will be able to:	
	1. Read and write Roman numerals (1-39).	300
	2. Express the following Roman numerals as Arabic numerals: I, V, X, L, C, D, and M.	300
	3. Write Roman numerals for standard numerals.	302

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Curriculum Outline	Performance Objectives	Activity Page Number
	4. Write standard numerals for Roman numerals.	302
	5. Identify and read Roman numerals for one through three hundred.	300
G. Rounding Numbers	G. To facilitate learning of rounding numbers, the student will be able to:	
	***1. Round numbers to the nearest ten.	303
	2. Round numbers to the nearest ten and hundred.	303
	**3. Round numbers to the nearest hundred.	303
	**4. Round numbers to the nearest thousand.	303
	*5. Round numbers to any specified place value through one million.	305
H. Prime and Composite Factors	H. To develop an understanding of prime and composite numbers, the student will be able to:	
	**1. Identify prime numbers less than one hundred.	308
	2. Identify composite numbers.	308

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Curriculum Outline	Performance Objectives	Activity Page Number
	3. Find the possible factors of a number less than one hundred.	309
	4. Find the common factors of two or more numbers less than one hundred.	310
	5. Write a number as the product of prime factors.	312
	6. Find the common multiples of two or more numbers less than thirty.	314
I. Integers	I. To develop an understanding of integers, the student will be able to:	
	1. Define and identify the set of integers.	315
	2. Classify integers as a positive integer, zero, or a negative integer.	316
	3. Locate points on the number line corresponding to given integers.	317
	4. Identify opposites (additive inverse) as a pair of integers whose sum is 0.	318
	5. Order three or more integers, beginning with the smallest.	319
	6. Add integers.	321

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Curriculum Outline	Performance Objectives	Activity Page Number
	7. Subtract integers.	322
	8. Multiply integers.	324
	9. Divide integers.	325
II. Whole Numbers and Operations		
A. Addition	A. To demonstrate a proficiency in addition of whole numbers, the student will be able to:	
	**1. Estimate a sum to the appropriate place value.	353
	**2. Add columns of numbers with five or less digits, five or less addends.	354
	3. Add whole numbers.	356
B. Subtraction	B. To demonstrate a proficiency in subtraction of whole numbers, the student will be able to:	
	1. Subtract a four-digit number from a four-digit number with regrouping.	369
	**2. Subtract one number from another (minuends to five digits).	371

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Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
C. Multiplication	C. To demonstrate an understanding of multiplication of whole numbers, the student will be able to:	
	1. Recall basic multiplication facts in rapid response drill, written and oral.	374
	2. Check multiplication by reversing factors and multiplying again.	378
	3. Multiply by ten and one hundred.	379
	***4. Multiply a two-digit number by a two-digit number.	381
	***5. Multiply a three-digit number by a two-digit number.	381
	6. Check multiplication by division.	383
	***7. Multiply by ten; one hundred; one thousand.	385
	**8. Multiply a three-digit number by a three-digit number.	381
	*9. Multiply a four-digit number by any number of four digits or less.	381

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Curriculum Outline	Performance Objectives	Activity Page Number
	*10. Multiply by ten thousand; one hundred thousand; one million.	385
	*11. Write powers of ten in exponential form.	387
	12. Estimate products.	414
	13. Solve word problems involving multiplication of whole numbers.	710
D. Division	D. To demonstrate an understanding of division of whole numbers, the student will be able to:	
	1. Use repeated subtraction to show the relationship of subtraction and division.	388
	2. Use divisibility rules to determine if a number is divisible by 2, 3, 4, 5, 6, 9, 10.	396
	***3. Divide by multiple of ten.	403
	***4. Divide a two-digit number by a two-digit number (no remainder).	405
	**5. Divide a three-digit number by a two-digit number (no remainder).	405

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Curriculum Outline	Performance Objectives	Activity Page Number
	**6. Divide a four-digit number by a two-digit number (no remainder).	405
	**7. Divide a two-digit number by a two-digit number with remainder.	405
	**8. Divide a three-digit number by a two-digit number with remainder.	405
	**9. Divide a four-digit number by a two-digit number with remainder.	405
	**10. Divide a five-digit number by a two-digit number with remainder.	405
	***11. Express remainders as fractions.	407
	12. Find the quotient when the divisor is ten, one hundred, or one thousand.	408
	*13. Divide by multiples of one hundred.	410
	*14. Divide a number of more than three digits by a three-digit number.	411
	15. Find the quotient when there is one or more zeros in the quotient.	413
	16. Estimate quotients.	415

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Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	17. Solve simple linear equations with one unknown whose answer is a whole number.	416
	18. Solve word problems using division of whole numbers.	710
	19. Solve two-step word problems using all operations on whole numbers.	710
	20. Compute the average on not more than five numbers with a maximum of three digits.	417
	**21. Check division by multiplication.	401
III. Fractions and Operations		
A. Fractional Numbers	A. To develop an understanding of fractions, the student will be able to:	
	1. Identify and write equivalent fractional numbers.	433
	2. Compare fractions using >, < , = .	435
	**3. Identify proper fractions, improper fractions, and mixed numbers.	439

COURSE CONTENT

Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**4. Identify the common fraction that represents the shaded area of a grid figure when compared to the total area (2/5, 3/5, 3/8, 5/8, 7/8).	446
	***5. Continue consecutive equivalency pattern of fractions. (Example: 1/2, 2/4, 3/6,...)	447
	**6. Determine the greatest common factor (GCF) of numbers.	449
	**7. Rename fractions in simplest form.	451
	**8. Rename fractions in higher terms.	452
	**9. Rename mixed numbers and/or whole numbers as improper fractions.	453
	**10. Rename improper fractions as mixed numbers and/or whole numbers.	454
	**11. Determine the least common multiple (LCM) of two or more numbers.	456
	**12. Rename fractions with unlike denominators to fractions with common denominators.	457
B. Addition of Fractions	B. To develop an understanding of addition of fractions, the student will be able to:	

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Curriculum Outline	Performance Objectives	Activity Page Number
	**1. Add fractions with like denominators, renaming sums.	458
	**2. Add fractions with unlike denominators.	459
	**3. Add mixed numbers with unlike denominators.	461
	4. Solve word problems using addition of fractions.	710
C. Subtraction of Fractions	C. To develop an understanding of subtraction of fractions, the student will be able to:	
	**1. Subtract fractions with like denominators, renaming difference.	460
	**2. Subtract fractions with unlike denominators.	462
	**3. Subtract a fraction from a whole number.	464
	**4. Subtract mixed numbers with like denominators with regrouping.	465
	**5. Subtract mixed numbers with unlike denominators (no regrouping).	468
	**6. Subtract mixed numbers with unlike denominators with regrouping.	465

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Curriculum Outline	Performance Objectives	Activity Page Number
	7. Subtract fractions and mixed numbers.	467
	8. Solve word problems using subtraction of fractions.	710
	9. Solve word problems using addition and subtraction of fractions.	710
D. Multiplication of Fractions	D. To develop an understanding of multiplication of fractions, the student will be able to:	
	**1. Multiply a whole number by a proper fraction.	469
	**2. Multiply two proper fractions.	470
	**3. Multiply a mixed number by a proper fraction.	471
	**4. Multiply a whole number by a mixed number.	472
	**5. Multiply two mixed numbers.	474
	6. Solve word problems using multiplication of fractions.	710
	7. Solve word problems using addition, subtraction, and/or multiplication of fractions.	710

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Curriculum Outline	Performance Objectives	Activity Page Number
E. Division of Fractions	E. To develop an understanding of the division of fractions, the student will be able to:	
	**1. Identify the multiplicative inverse (reciprocal).	475
	**2. Divide a proper fraction by a proper fraction.	475
	**3. Divide a whole number by a proper fraction.	475
	**4. Divide a proper fraction by a whole number.	475
	**5. Divide a mixed number by a proper fraction.	477
	**6. Divide a proper fraction by a mixed number.	477
	**7. Divide a mixed number by a mixed number.	478
	8. Name the product in simplest form by using cancellation before multiplying.	480
	9. Divide a mixed number by a whole number.	478

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Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	10. Divide a whole number by a mixed number.	478
	*11. Write a sequence of fractions in order.	482
	12. Solve word problems using division of fractions and other operations.	710
IV. Decimal Fractions and Operations		
A. Decimal Fractions	A. To develop an understanding of decimal fractions, the student will be able to:	
	***1. Read and write decimals through thousandths.	485
	2. Read and write any decimal numeral to millionths.	485
	3. Read and write word names for decimal fractions.	486
	4. Recognize the place value of decimal fractions through hundred thousandths.	487
	5. State the place value of each digit in a given decimal number as a fraction.	487

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Curriculum Outline	Performance Objectives	Activity Page Number
	***6. Identify decimal equivalents to 1/3, 2/3, 1/6-5/6, 1/8-7/8.	492
	*7. Round decimal fractions to tenths, hundredths, thousandths, or ten thousandths.	493
	8. Choose from a list of decimals, those that are the same.	494
	9. Write, count and expand decimal fractions.	495
	***10. Write several decimals in order according to size (limit: hundredths).	496
	*11. Write several decimals in order according to size (limit: thousandths).	496
	12. Write decimals in order according to size (no limit).	498
	13. Use symbols for greater than, less than, and equal to to compare decimal fractions.	500
	14. Rename a given fraction to an equivalent fraction whose denominator is a power of 10 and then rename as the decimal equivalent.	511

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Curriculum Outline	Performance Objectives	Activity Page Number
	*15. Change common fraction to the decimal equivalent.	513
	16. Change a decimal fraction to an equivalent common fraction.	515
	17. Change a fraction to a decimal fraction when the result is a terminating decimal.	517
	18. Change a fraction to a decimal fraction when the result is a repeating decimal.	519
	19. Denote a repeating decimal by writing a bar over the digit, or groups of digits, that repeat.	519
	20. Write the decimal equivalent of a fraction or mixed number.	521
B. Decimal Operations	B. To develop an understanding of decimal operations, the student will be able to:	
	***1. Add decimals through thousandths.	501
	2. Find the sum of two or more decimal fractions having the same number of decimal places.	501

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Curriculum Outline	Performance Objectives	Activity Page Number
	3. Find the sum of two or more decimal fractions having a different number of decimal places.	501
	***4. Subtract decimals through thousandths.	503
	5. Find the difference of two decimal fractions having the same number of decimal places.	503
	6. Find the difference of two or more decimal fractions having a different number of decimal places.	503
	7. Solve word problems using addition and subtraction of decimals	710
	**8. Multiply a whole number (limit three digits) by a decimal (limit: thousandths).	504
	*9. Multiply a decimal by a decimal (limit: thousandths).	505
	10. Multiply a whole number and .1, .01, .001, and .0001.	507
	11. Multiply a decimal fraction and .1, .01, .001, and .0001.	507
	12. Solve word problems using multiplication of decimals.	710

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Curriculum Outline	Performance Objectives	Activity Page Number
	13. Solve word problems using addition, subtraction, and/or multiplication of decimals.	710
	14. Divide decimal fraction by a whole number.	509
	*15. Find the quotient of a decimal fraction divided by a decimal fraction.	509
	16. Solve word problems involving division of decimals.	710
V. Percent, Ratio and Proportion		
A. Ratio and Proportion	A. To demonstrate a working knowledge of ratio and proportion, the student will be able to:	
	1. Define a ratio.	524
	2. Name a ratio in several ways.	526
	3. Use a ratio to compare the number of objects in two sets.	527
	4. Use a ratio to compare the number to another.	527

COURSE CONTENT

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Curriculum Outline	Performance Objectives	Activity Page Number
	**5. Express a ratio of two numbers including the comparison of a shaded area to the total area.	528
	6. Recognize and use ratios in map reading.	529
	7. Simplify ratios and determine whether two given ratios are equivalent.	531
	8. Define a proportion.	524
	**9. Find the missing term of a proportion.	533
	*10. Identify means and extremes and tell if a proportion is true.	534
B. Percent	B. To demonstrate a working knowledge of percent, the student will be able to:	
	1. Define percent.	524
	**2. Change a decimal to a percent.	536
	**3. Change a percent to a decimal.	536
	**4. Change common fractions with denominators of 2, 3, 4, 5, 8, 10, 20, 25, 50, and 100 to percents.	537

COURSE CONTENT

Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**5. Find the percent of a given number.	539
	6. Solve word problems to find the percent of a given number.	710
	*7. Change a fraction, mixed number, decimal fraction, or ratio to a percent.	541
	*8. Change a percent to a fraction, mixed number, decimal fraction, or ratio.	543
	9. Use decimal fractions and fractions to compute with percent.	544
	10. Express a percent as a ratio whose denominator is 100.	545
	11. Express a ratio as a percent, fraction, or decimal.	546
	12. Rename a percent or a decimal as a ratio in lowest terms.	546
	*13. Find a number when a percent of it is known.	548
	14. Solve word problems to find a number when a percent of it is known.	710
	*15. Find what percent one number is of another.	550

COURSE CONTENT

Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	16. Solve word problems to find what percent one number is of another.	710
	17. Solve discount problems.	551
	18. Solve commission problems.	553
VI. Squares and Square Roots		
A. Computation of Squares and Square Roots	A. To demonstrate a basic knowledge of squares and square roots, the student will be able to:	
	*1. Compute the square of a one- or two-digit number.	559
	2. Find the square root of a perfect square less than 225.	562
	3. Find the square of one-, two- or more digit numbers.	559
VII. Relations and Functions		
A. Graphs	A. To develop an understanding of graphs, the student will be able to:	
	***1. Interpret simple data from a simple bar graph.	570
	*2. Interpret data from a simple line graph, pictograph, or circle graph.	570

COURSE CONTENT

Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**3. Construct a bar graph from given data.	574
	4. Construct, read, and interpret bar graphs.	574
	5. Use information from a line graph.	571
VIII. Measurement and Estimation		
A. Time	A. To demonstrate an understanding of time, the student will be able to:	
	1. Record time - no limit.	592
	***2. Tell time to the nearest minute.	595
	*3. Read time to the nearest minute and compute sums or differences in time problems involving hours.	596
	4. Solve word problems involving time in days, weeks, months, or years with conversion.	710
B. Money	B. To develop an understanding of money, the student will be able to:	
	1. Add and subtract dollars and cents.	602
	2. Count change to $5.00, $10.00.	601

COURSE CONTENT

Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	3. Multiply and divide money.	603
	*4. Compute problems involving money.	604
	5. Solve two-step word problems involving amounts of money.	710
C. Linear Measure	C. To develop an understanding of linear measure, the student will be able to:	
	1. Measure lengths in inches, feet, and yards.	610
	*2. Measure a length to the nearest 1/4 and/or 1/8 inch.	607
	3. Measure lengths to the nearest mm.	611
	**4. Determine the appropriate unit to measure length in metric and customary.	612
D. Liquid Measure	D. To develop an understanding of liquid measure, the student will be able to:	
	**1. Determine the appropriate unit to measure capacity (liquids) in metric and customary.	623
	2. Measure capacity in liters and milliliters.	611

COURSE CONTENT

Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
E. Weight (mass) and Thermometer	E. To develop an understanding of weight and thermometer, the student will be able to:	
	**1. Determine the appropriate unit to measure weight (mass) in metric and customary.	616
	***2. Read a Celsius thermometer.	617
	***3. Read a Fahrenheit thermometer.	617
F. Symbols and Conversions	F. To develop an understanding of symbols and conversions, the student will be able to:	
	1. Recognize abbreviations and value of the common units of measurement in the customary system.	625
	2. Recognize the symbols and the value of the common units of measurement in the metric system.	627
	**3. Convert linear, square, capacity, and weight measurements to equivalent measures within the metric system.	630
	**4. Convert linear, square, capacity, and weight measurements to equivalent measures within the customary system.	632

COURSE CONTENT

Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
G. Computation	G. To develop an understanding of computation, the student will be able to:	
	1. Add and/or subtract customary measures with regrouping.	633
	2. Add and/or subtract metric measures with regrouping.	634
IX. Geometry		
A. Lines	A. To demonstrate an understanding of lines, the student will be able to:	
	***1. Identify pairs of intersecting and parallel lines.	656
	***2. Identify horizontal and vertical lines.	657
	*3. Identify and use perpendicular lines.	658
	4. Identify and use intersecting, oblique (skew), and parallel lines.	658
	5. Identify bisector of line segment, bisector of an angle, perpendicular lines, congruent figures.	704
B. Angles	B. To demonstrate an understanding of angles, the student will be able to:	

COURSE CONTENT

Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	1. Identify the sides and vertex of an angle.	659
	***2. Identify an angle, parts of an angle, and a right angle.	661
	3. Draw an angle and label the vertex and sides.	659
	**4. Measure an angle using a protractor.	661
	5. Measure given angles with a protractor correct within two degrees.	664
	6. Find the measure of the third angle of a triangle when given the measures of the other two angles.	665
	7. Identify and use right, congruent, opposite, and alternating angles.	666
	**8. Identify and draw a right angle, an acute angle, and an obtuse angle.	668
	9. Copy an angle using a straight edge and a compass.	669
C. Figures	C. To develop an understanding of figures, the student will be able to:	

COURSE CONTENT

Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	1. Construct and label points, lines, segments, rays, angles, and planes.	670
	*2. Recognize congruent figures.	671
	3. Recognize similar figures.	672
D. Polygons	D. To develop an understanding of polygons, the student will be able to:	
	1. Identify the parts of a right triangle.	692
	2. Classify a triangle according to sides as isosceles, equilateral, or scalene.	693
	3. Classify a triangle according to angles as acute, right, obtuse, or equiangular.	695
	*4. Identify the altitude and base of a triangle and parallelogram.	682
	**5. Identify and classify a quadrilateral as a square, rectangle, parallelogram, trapezoid, or rhombus.	698
	6. Identify and draw plane figures: quadrilateral, parallelogram, rectangle, square, rhombus, pentagon, hexagon, octagon.	700

Curriculum Outline	Performance Objectives	Activity Page Number
	7. Identify and use parallel and perpendicular planes.	702
	8. Use the Pythogorean Rule.	708
	9. Compute the perimeter of scalene, isosceles, and equilateral triangles.	675
	10. Compute perimeter of quadrilaterals (rhombus, parallelogram, trapezoid).	477
	***11. Compute the area of a square and a rectangle using the appropriate formula.	681
	12. Find the area of a triangle using the formula $A=\frac{1}{2}(bxh)$.	683
	13. Find the area of a parallelogram using the formula $A=bh$.	684
	14. Find the area of a trapezoid using the formula $A=\frac{1}{2}h(a+b)$.	685
E. Circle	E. To develop an understanding of a circle, the student will be able to:	
	1. Identify the parts of a circle: center, radius, chord, diameter, circumference, arc, semicircle.	654

COURSE CONTENT

Sixth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**2. Recognize and use π in fraction (22/7) or decimal (3.14) form.	679, 686
	3. Find the area of a circle using the correct formula.	686
	4. Compute the circumference of a circle by using the appropriate formula.	679
F. Solid/Spatial Figures	F. To develop an understanding of solid/spatial figures, the student will be able to:	
	**1. Identify common spatial figures (cube, pyramid, sphere, rectangular prism, cone, cylinder)	703
	**2. Compute the volume of a cube and a rectangular prism.	688
	3. Identify and use various formulas for finding volume of solid figures: prisms, pyramids, cylinders, cones, and spheres.	690
	4. Identify and use various formulas for finding surface area of solid figures: prisms, cones, pyraminds, cylinders, and spheres.	696

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
I. Numeration		
A. Operations	A. To exhibit an understanding of operations, the student will be able to:	
	*1. Supply the missing numbers in a sequence which requires +, -, x or ÷ .	268
	2. Determine the pattern for a given number sequence.	269
B. Word Names	B. To demonstrate an understanding of word names, the student will be able to:	
	**1. Read and write number words through ten thousands place.	286
	**2. Read and write number words through hundred thousands place.	286
	3. Read and write word number words through millions.	286
	4. Read and write number words through billions.	286
C. Place Value	C. To exhibit an understanding of place value, the student will be able to:	
	1. Recognize place value to hundred millions.	283

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***2. Recognize place value of decimal numbers through thousandths.	288
	3. Identify the value of a digit in numbers through hundred thousandths place.	288
	4. State and write the place, face, and total value of base ten numbers through billions.	289
	5. Write a standard number in expanded form using exponential notation.	293
	*6. Find the value of an expression such as 4^3.	292
D. Roman Numerals	D. To demonstrate an understanding of Roman numerals, the student will be able to:	
	**1. Read and write Roman numerals (1-39).	300
	2. Write Roman numerals for standard numerals.	302
	3. Write standard numerals for Roman numerals.	302
	4. Identify and read Roman numerals for one through three hundred.	300

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
E. Rounding	E. To demonstrate an understanding of rounding numbers, the student will be able to:	
	1. Round numbers to the nearest ten and hundred.	303
	***2. Round off a given number less than one thousand to the nearest hundred.	303
	**3. Round off a given number of ten thousand or less to the nearest thousand.	303
	**4. Round numbers through millions.	305
F. Prime and Composite Factors	F. To develop an understanding of prime and composite numbers, the student will be able to:	
	***1. Identify prime numbers less than one hundred.	308
	2. Identify composite numbers.	308
	3. Find the possible factors of a number less than one hundred.	309
	4. Find the common factors of two or more numbers less than one hundred.	310
	5. Write a number as the product of prime factors.	312

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	6. Find the common multiples of two or more numbers less than thirty.	314
G. Integers	G. To develop an understanding of integers, the student will be able to:	
	*1. Identify the set of integers.	315
	2. Classify integers as a positive integer, zero, or a negative integer.	316
	*3. Locate points on the number line corresponding to given integers.	317
	4. Identify opposites (additive inverse) as a pair of integers whose sum is 0.	318
	5. Order three or more integers, beginning with the smallest.	319
	*6. Determine the absolute value of a given integer.	320
	*7. Add integers.	321
	*8. Subtract integers.	322
	9. Multiply integers.	324
	10. Divide integers.	325

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
II. Whole Numbers and Operations		
A. Addition	A. To demonstrate proficiency in addition of whole numbers, the student will be able to:	
	**1. Estimate a sum to the appropriate place value.	353
	***2. Add columns of numbers using four- and five-digit numbers.	354
	3. Add whole numbers.	356
B. Subtraction	B. To demonstrate proficiency in subtraction of whole numbers, the student will be able to:	
	***1. Subtract one number from another (minuends to five digits).	371
C. Multiplication	C. To demonstrate proficiency in multiplication of whole numbers, the student will be able to:	
	1. Recall basic multiplication facts in rapid response drill, written and oral.	374
	2. Check multiplication by reversing factors and multiplying again.	378

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	3. Multiply by ten and one hundred.	379
	4. Check multiplication by division.	383
	***5. Multiply a three-digit number by a three-digit number.	381
	**6. Find the product when the factors are two, three, or four digits.	381
	**7. Multiply by ten thousand; one hundred thousand; one million.	385
	**8. Write powers of ten in exponential form.	387
	9. Solve word problems involving multiplication of whole numbers.	710
	10. Estimate products.	414
D. Division	D. To demonstrate proficiency in division, the student will be able to:	
	1. Use divisibility rules to determine if a number is divisible by 2, 3, 4, 5, 6, 9, 10.	396
	**2. Check computation by multiplication and addition in division.	401
	***3. Divide a three-digit number by a two-digit number (no remainder).	405

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***4. Divide a four-digit number by a two-digit number (no remainder).	405
	***5. Divide a two-digit number by a two-digit number with remainder.	405
	***6. Divide a three-digit number by a two-digit number with remainder.	405
	***7. Divide a four-digit number by a two-digit number with remainder.	405
	***8. Divide a five-digit number by a two-digit number with remainder.	405
	9. Find the quotient when the divisor is ten, one hundred, or one thousand.	408
	**10. Find the quotient when the divisor is a multiple of ten, one hundred, or one thousand.	410
	**11. Find the quotient when the divisor is a one-, two-, or three-digit non-zero number.	411
	12. Find the quotient when there is one or more zeros in the quotient.	413

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	13. Estimate quotients.	415
	*14. Solve simple linear equations with one unknown whose answer is a whole number.	416
	15. Solve word problems using division of whole numbers.	710
	16. Solve two-step word problems using all operations on whole numbers.	710
	***17. Compute the average on not more than five numbers each with a maximum of three digits.	417
III. Fractions and Operations		
A. Fractional Numbers	A. To develop an understanding of fractions, the student will be able to:	
	1. Compare fractions using >, <, =.	435
	**2. Identify proper, improper, and mixed fractions.	439
	***3. Identify the common fraction that represents the shaded area of a grid figure when compared to the total area (2/5, 3/5, 3/8, 5/8 7/8).	446
	***4. Determine the greatest common factor (GCF) of numbers.	449

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***5. Rename fractions in simplest terms.	451
	***6. Rename fractions in higher terms.	452
	***7. Rename mixed numbers and/or whole numbers as improper fractions.	453
	***8. Rename improper fractions as mixed numbers and/or whole numbers.	454
	***9. Determine the least common multiple (LCM) of two or more numbers.	456
	***10. Rename fractions with unlike denominators to fractions with like denominators.	457
B. Additions of Fractions	B. To develop an understanding of addition of fractions, the student will be able to:	
	***1. Add fractions with like denominators, renaming sums.	458
	***2. Add fractions with unlike denominators.	459
	***3. Add mixed numbers with unlike denominators.	461
C. Subtraction of Fractions	C. To develop an understanding of subtraction of fractions, the student will be able to:	

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***1. Subtract fractions with like denominators, renaming difference.	460
	***2. Subtract fractions with unlike denominators.	462
	***3. Subtract a fraction from a whole number.	464
	**4. Subtract mixed numbers with like denominators with regrouping.	465
	***5. Subtract mixed numbers with unlike denominators (no regrouping).	468
	**6. Subtract mixed numbers with unlike denominators with regrouping.	465
	7. Subtract fractions and mixed numbers.	467
	8. Solve word problems using subtraction of fractions.	710
	9. Solve word problems using addition and subtraction of fractions.	710
D. Multiplication of Fractions	D. To develop an understanding of multiplication of fractions, the student will be able to:	

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***1. Multiply a whole number by a proper fraction.	469
	***2. Multiply two proper fractions.	470
	**3. Multiply a mixed number by a proper fraction.	471
	**4. Multiply a whole number by a mixed number.	472
	**5. Multiply two mixed numbers.	474
	6. Solve word problems using multiplication of fractions.	710
	7. Solve word problems using addition, subtraction, and/or multiplication of fractions.	710
E. Division of Fractions	E. To develop an understanding of division of fractions, the student will be able to:	
	***1. Identify the multiplicative inverse (reciprocal).	475
	***2. Divide a proper fraction by a proper fraction.	475
	***3. Divide a whole number by a proper fraction.	475

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***4. Divide a proper fraction by a whole number.	475
	**5. Divide a mixed number by a proper fraction.	477
	**6. Divde a proper fraction by a mixed number.	477
	**7. Divide a mixed number by a mixed number.	478
	8. Name the product in simplest form by using cancellation before multiplying.	480
	9. Divide a mixed number by a whole number.	478
	10. Divide a whole number by a mixed number.	478
	**11. Write a sequence of fractions in order.	482
	12. Solve word problems using division of fractions and other operations.	710

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
IV. Decimals and Operations		
A. Decimal Fractions	A. To develop an understanding of decimal fractions, the student will be able to:	
	1. Read and write any decimal numeral to millionths.	485
	2. Read and write word names for decimal fractions.	486
	3. Recognize the place value of decimal fractions through hundred thousandths.	487
	4. State the place value of each digit in a given decimal number as a fraction.	487
	***5. Round decimal fractions to tenths, hundredths, thousandths, or ten thousandths.	493
	6. Choose from a list of decimals, those that are the same.	494
	7. Write, count and expand decimal fractions.	495
	**8. Write several decimals in order according to size (limit: thousandths).	498

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*9. Write decimals in order according to size (no limit).	498
	10. Use symbols for greater than, less than, and equal to to compare decimal fractions.	500
	11. Rename a given fraction to an equivalent fraction whose denominator is a power of 10 and then rename as the decimal equivalent.	511
	**12. Change common fraction to the decimal equivalent.	513
	*13. Change a decimal fraction to a common fraction.	515
	14. Change a fraction to a decimal fraction when the result is a terminating decimal.	517
	15. Change a fraction to a decimal fraction when the result is a repeating decimal.	519
	16. Denote a repeating decimal by writing a bar over the digit, or groups of digits, that repeat.	519
	17. Write the decimal equivalent of a fraction or mixed number.	521

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
B. Decimal Operations	B. To develop an understanding of decimal operations, the student will be able to:	
	1. Find the sum of two or more decimal fractions having the same number of decimal places.	501
	2. Find the sum of two or more decimal fractions having a different number of decimal places.	501
	3. Find the difference of two decimal fractions having the same number of decimal places.	503
	4. Find the difference of two or more decimal fractions having a different number of decimal places.	503
	***5. Multiply a whole number by a decimal.	504
	***6. Multiply a decimal by a decimal.	505
	7. Multiply a whole number and .1, .01, .001, and .0001.	507
	8. Multiply a decimal fraction and .1, .01, .001, and .0001.	507
	9. Find the quotient of a decimal fraction divided by a whole number.	509

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**10. Find the quotient of a decimal fraction divided by a decimal fraction.	509
	11. Solve word problems using multiplication of decimals.	710
	12. Solve word problems using addition, subtraction, and/or multiplication of decimals.	710
	13. Solve word problems involving division of decimals.	710
V. Percent, Ratio, and Proportion		
A. Ratio and Proportion	A. To demonstrate a working knowledge of ratio and proportion, the student will be able to:	
	1. Define a ratio.	524
	2. Name a ratio in several ways.	526
	3. Use a ratio to compare the number of objects in two sets.	527
	4. Use a ratio to compare one number to another.	527
	**5. Express a ratio of two numbers including the comparison of a shaded area to the total area.	528

Curriculum Outline	Performance Objectives	Activity Page Number
	*6. Recognize and use ratios in map reading.	527
	7. Simplify ratios and determine whether two given ratios are equivalent.	531
	8. Define a proportion.	524
	**9. Find the missing term of a proportion.	533
	10. Identify means and extremes and tell if a proportion is true.	534
B. Percent	B. To demonstrate a working knowledge of percent, the student will be able to:	
	1. Define percent.	524
	***2. Change a decimal to a percent.	536
	***3. Change a percent to a decimal.	536
	***4. Change common fractions with denominators of 2, 3, 5, 8, 10, 20, 25, 50, and 100 to percent.	537
	***5. Find the percent of a given number.	539
	**6. Change a fraction, mixed number, decimal fraction, or ratio to a percent.	541

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**7. Change a percent to a fraction, mixed number, decimal fraction, or ratio.	543
	8. Use decimal fractions and fractions to compute with percent.	544
	9. Express a percent as a ratio whose denominator is 100.	545
	10. Express a ratio as a percent, fraction, or decimal.	546
	11. Rename a percent or a decimal as a ratio in lowest terms.	546
	**12. Find a number when a percent of it is known.	548
	**13. Find what percent one number is of another.	550
	14. Solve discount problems.	551
	15. Solve commission problems.	553
	*16. Compute percent of increase and percent of decrease.	554
	*17. Use the formula, I=PRT, to compute interest.	556

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	18. Solve word problems to find the percent of a given number.	710
	19. Solve word problems to find what percent one number is of another.	710
	20. Solve word problems to find a number when a percent of it is known.	710
VI. Squares and Square Root		
A. Computation of Squares and Square Roots	A. To demonstrate a basic knowledge of squares and square roots, the student will be able to:	
	**1. Compute the square of a one- or two-digit number.	559
	2. Find the square root of a perfect square less than 225.	562
	3. Find the square of a one-, two-, or more digit number.	559
	*4. Identify square roots of numbers that are perfect squares.	562
	*5. Use a table to find the square root of a number.	560
	6. Find the square root of a number by using the square root algorithm.	560

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
VII. Relations and Functions		
A. Graphs	A. To develop an understanding of graphs, the student will be able to:	
	***1. Interpret data from a simple line graph, pictograph, or circle graph.	570
	**2. Construct a bar graph from given data.	574
	3. Construct, read, and interpret bar graphs.	574
	*4. Use information from a line graph.	571
	*5. Construct an appropriate graph (pictograph, line graph, circle graph) from given data.	576
VIII. Measurement and Estimation		
A. Time	A. To demonstrate an understanding of time the student will be able to:	
	1. Record time - no limit.	592
	**2. Read time to the nearest minute and compute sums or differences in time problems involving hours.	596

Curriculum Outline	Performance Objectives	Activity Page Number
	3. Solve word problems involving time in days, weeks, months, or years with conversion.	710
B. Money	B. To develop an understanding of money, the student will be able to:	
	1. Count change to $5.00, $10.00.	601
	2. Multiply and divide money.	603
	**3. Compute problems involving money.	604
	4. Solve two-step word problems involving amounts of money.	710
C. Linear Measure	C. To develop an understanding of linear measure, the student will be able to:	
	***1. Measure a length to the nearest 1/4 and/or 1/8 inch.	607
	2. Measure lengths to the nearest mm.	611
	**3. Determine the appropriate unit to measure length in metric and customary.	612
D. Liquid Measure	D. To develop an understanding of liquid measure, the student will be able to:	

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**1. Determine the appropriate unit to measure capacity (liquids) in metric and customary.	623
	2. Measure capacity in liters and milliliters.	611
E. Weight (mass)	E. To develop an understanding of weight the student will be able to:	
	**1. Determine the appropriate unit to measure weight (mass) in metric and customary.	616
F. Symbols and Conversions	F. To develop an understanding of symbols and conversions, the student will be able to:	
	1. Recognize abbreviations and value of the common units of measurement in the customary system.	625
	2. Recognize the symbols and the value of the common units of measurement in the metric system.	627
	**3. Convert linear, square, capacity, and weight measurements to equivalent measures within the metric system.	630
	**4. Convert linear, square, capacity, and weight measurements to equivalent measures within the customary system.	682

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
G. Computation	G. To develop an understanding of computation, the student will be able to:	
	*1. Add and/or subtract customary measures with regrouping.	633
	*2. Add and/or subtract metric measures with regrouping.	634
	3. Designate a measurement as a cardinal number and a word telling things counted.	635
	4. Tell which of two given measurements is more precise.	636
	5. Tell the greatest possible error of measurement is one-half the unit used for measuring.	637
	6. Show the maximum length or minimum length of a measurement can be found by respectively adding or subtracting GPE to or from the measurement.	638
	7. Relate temperature in degrees to hot, cold, or comfortable.	639
IX. Geometry		
A. Figures	A. To develop a knowledge of geometric figures, the student will be able to:	

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***1. Identify and use perpendicular lines.	658
	2. Identify and use intersecting, oblique (skew), and parallel lines.	658
	3. Construct and label points, lines, segments, rays, angles, and planes.	670
	***4. Recognize congruent figures.	671
	*5. Recognize similar figures.	672
B. Angles	B. To demonstrate a knowledge of angles, the student will be able to:	
	1. Identify the sides and vertex of an angle.	659
	2. Draw an angle and label the vertex and sides.	659
	***3. Measure an angle using a protractor.	661
	4. Measure given angles with a protractor correct within two degrees.	664
	5. Find the measure of the third angle of a triangle when given the measures of the other two angles.	665

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	6. Identify and use right, congruent, opposite, and alternating angles.	666
	**7. Identify and draw a right angle, an acute angle, and an obtuse angle.	668
	8. Copy an angle using a straightedge and a compass.	669
	*9. Identify bisector of line segment, bisector of an angle, perpendicular lines, congruent figures.	704
C. Polygons	C. To demonstrate a knowledge of polygons, the student will be able to:	
	*1. Identify the parts of a right triangle.	692
	*2. Classify a triangle according to sides as isosceles, equilateral, or scalene.	693
	*3. Classify a triangle according to angles as acute, right, obtuse, or equiangular.	695
	4. Identify and draw plane figures: quadrilateral, parallelogram, rectangle, square, rhombus, pentagon, hexogon, octagon.	700

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	5. Identify and use parallel and perpendicular planes.	702
	*6. Compute the perimeter of scalene, isosceles, and equilateral triangles.	675
	*7. Compute perimeter of quadrilaterals (rhombus, parallelogram, trapezoid).	677
	***8. Identify the altitude and base of a triangle and parallelogram.	682
	*9. Find the area of a triangle using the formula $A=\frac{1}{2}(b \times h)$.	683
	*10. Find the area of a parallelogram using the formula $A=bh$.	684
	11. Find the area of a trapezoid using the formula $A=\frac{1}{2}h(a+b)$.	685
	**12. Identify and classify a quadrilateral as a square, rectangle, parallelogram, trapezoid, or rhombus.	698
	13. Recognize regular polygons of ten or less sides.	706
	14. Use the Pythagorean Rule.	708
D. Circles	D. To demonstrate a knowledge of circles, the student will be able to:	

COURSE CONTENT

Seventh Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	1. Identify the parts of a circle: center, radius, chord, diameter, circumference, arc, semicircle.	654
	*2. Compute the circumference of a circle by using the appropriate formula.	679
	*3. Find the area of a circle using the correct formula.	686
E. Solid/Spatial Figures	E. To demonstrate a knowledge of solid/spatial figures, the student will be able to:	
	**1. Identify common spatial figures (cube, pyramid, sphere, rectangular prism, cone, cylinder).	703
	2. Identify and use various formulas for finding surface area of solid figures: prisms, cones, pyramids, cylinders, and spheres.	696
	**3. Compute the volume of a cube and a rectangular prism.	688
	4. Identify and use various formulas for finding volume of solid figures: prisms, pyramids, cylinders, cones, and spheres.	690

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
I. Numeration		
A. Place Value and Sequence	A. To demonstrate an understanding of place value and sequence, the student will be able to:	
	1. State and write the place, face, and total value of base ten numbers through billions.	289
	2. Write a standard number in expanded form using exponential notation.	283
	**3. Find the value of an expression such as 4^3.	283
	**4. Supply the missing numbers in a sequence which requires +, -, x, or ÷.	268
B. Word Names	B. To demonstrate an understanding of word names, the student will be able to:	
	**1. Read and write number words through ten thousands place.	286
	**2. Read and write number words through hundred thousands place.	286
	**3. Read and write number words through millions.	286

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	4. Read and write number words through billions.	286
C. Rounding	C. To demonstrate an understanding of rounding, the student will be able to:	
	***1. Round numbers to the nearest thousand.	303
	**2. Round numbers to any specified place value through one million.	305
D. Roman Numerals	D. To develop an understanding of Roman numerals, the student will be able to:	
	**1. Read and write Roman numerals (1-39).	300
	2. Write Roman numerals for standard numerals.	302
	3. Write standard numerals for Roman numerals.	302
	4. Identify and read Roman numerals for one through three hundred.	300
E. Factors, Multiples, and Composites	E. To demonstrate an understanding of factors, multiples and composites, the student will be able to:	
	1. Identify composite numbers.	308

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	2. Find the common factors of two or more numbers less than one hundred.	310
	3. Write a number as the product of prime factors.	312
	4. Find the common multiples of two or more numbers less than thirty.	314
F. Integers	F. To demonstrate an understanding of integers, the student will be able to:	
	**1. Define and identify the set of integers.	315
	2. Classify integers as a positive integer, zero, or a negative integer.	316
	**3. Locate points on the number line corresponding to given integers.	317
	4. Identify opposites (additive inverse) as a pair of integers whose sum is 0.	128
	5. Order three or more integers, beginning with the smallest.	319
	**6. Determine the absolute value of a given integer.	320
	**7. Add integers.	321
	**8. Subtract integers.	322

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*9. Multiply integers.	324
	*10. Divide integers.	325
II. Whole Numbers		
A. Addition and Subtraction	A. To demonstrate knowledge of addition and subtraction, the student will be able to:	
	1. Add whole numbers.	356
	**2. Estimate a sum to the appropriate place value.	353
	3. Subtract whole numbers.	371
B. Multiplication	B. To demonstrate an understanding of multiplication of whole numbers, the student will be able to:	
	1. Recall basic multiplication facts in rapid response drill, written and oral.	374
	2. Estimate products.	414
	***3. Find the product when the factors are two, three, or four digits.	381
	***4. Multiply by ten thousand; one hundred thousand; one million.	385

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**5. Write powers of ten in exponential form.	387
	6. Check multiplication by reversing factors and multiplying again.	378
	7. Check multiplication by division.	383
	8. Solve word problems involving multiplication of whole numbers.	710
C. Division	C. To demonstrate a knowledge of division of whole numbers, the student will be able to:	
	1. Use divisibility rules to determine if a number is divisible by 2, 3, 4, 5, 6, 9, 10.	396
	2. Find the quotient when the divisor is ten, one hundred, or one thousand.	408
	**3. Find the quotient when the divisor is a multiple of one hundred.	410
	**4. Divide a number of more than three digits by three-digit numbers.	411
	5. Find the quotient when there is one or more zeros in the quotient.	413
	**6. Estimate quotients.	415

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**8. Check division by multiplication.	401
	9. Solve word problems using division of whole numbers.	710
	10. Solve two-step word problems using all operations on whole numbers.	710
	*11. Solve a simple linear equation of one unknown whose root is a whole number (two-step solution).	416
III. Fractions		
A. Identification, Comparing and Sequencing	A. To demonstrate a knowledge of fractions, the student will be able to:	
	1. Compare fractions using >, < , =.	435
	**2. Identify proper, improper, and mixed fractions.	439
	**3. Write a sequence of fractions in order.	482
B. Operations of Fractions	B. To demonstrate a knowledge of fractions operations, the student will be able to:	
	***1. Subtract mixed numbers with like denominators with regrouping.	465

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***2. Subtract mixed numbers with unlike denominators with regrouping.	465
	3. Subtract fractions and mixed numbers.	468
	***4. Multiply a mixed number by a proper fraction.	471
	***5. Multiply a whole number by a mixed number.	472
	***6. Multiply two mixed numbers.	474
	7. Solve word problems using multiplication of fractions.	710
	8. Solve word problems using addition, subtraction and/or multiplication of fractions.	710
	***9. Divide a mixed number by a proper number.	477
	***10. Divide a proper fraction by a mixed number.	477
	***11. Divide a mixed number by a mixed number.	478
	12. Name the product in simplest form by using cancellation before multiplying.	480

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	13. Divide a mixed number by a whole number.	478
	14. Divide a whole number by a mixed number.	478
	15. Solve word problems using division of fractions and other operations.	710
IV. Decimals		
A. Decimal Fractions	A. To demonstrate a knowledge of decimals, the student will be able to:	
	1. Read and write any decimal numeral to millionths.	485
	2. Read and write word names for decimal fractions.	486
	3. Recognize the place value of decimal fractions through hundred thousandths.	487
	4. State the place value of each digit in a given decimal number as a fraction.	487
	***5. Write several decimals in order according to size (limit: thousandths).	496, 498
	**6. Write decimals in order according to size (no limit).	498

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	7. Use symbols for greater than, less than, and equal to to compare decimal fractions.	500
	8. Choose from a list of decimals, those that are the same.	494
	9. Write, count and expand decimal fractions.	495
	10. Rename a given fraction to an equivalent fraction whose denominator is a power of 10 and then rename as the decimal equivalent.	511
	***11. Change common fraction to the decimal equivalent.	513
	***12. Change a decimal fraction to a common fraction.	515
	13. Change a fraction to a decimal fraction when the result is a terminating decimal.	517
	14. Change a fraction to a decimal fraction when the result is a repeating decimal.	519
	15. Denote a repeating decimal by writing a bar over the digit, or groups of digits, that repeat.	316

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	16. Write the decimal equivalent of a fraction or mixed number.	521
B. Decimal Operations	B. To demonstrate a knowledge of decimal operations, the student will be able to:	
	1. Find the sum of two or more decimal fractions having the same number of decimal places.	501
	2. Find the sum of two or more decimal fractions having a different number of decimal places.	501
	3. Find the difference of two decimal fractions having the same number of decimal places.	503
	4. Find the difference of two decimal fractions having a different number of decimal places.	503
	5. Multiply a whole number and .1, .01, .001, and .0001.	507
	6. Multiply a decimal fraction and .1, .01, .001, and .0001.	507
	7. Solve word problems using multiplication of decimals.	710
	8. Solve word problems using addition, subtraction, and/or multiplication of decimals.	710

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	9. Find the quotient of a decimal fraction divided by a whole number.	509
	**10. Find the quotient of a decimal fraction divided by a decimal fraction (limit: 5-digit dividends, 3-digit divisors).	509
	11. Solve word problems involving division of decimals.	710
V. Percent, Ratio and Proportion		
A. Ratio and Proportion	A. To develop an understanding of ratio and proportion, the student will be able to:	
	1. Define a ratio.	524
	2. Name a ratio in several ways.	526
	3. Use a ratio to compare the number of objects in two sets.	527
	4. Use a ratio to compare one number to another.	527
	**5. Express a ratio of two numbers including the comparison of a shaded area to the total area.	528
	**6. Recognize and use ratios in map reading.	529

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	7. Simplify ratios and determine whether two given ratios are equivalent.	531
	8. Define a proportion.	524
	**9. Find the missing term of a proportion.	533
	10. Identify means and extremes and tell if a proportion is true.	534
B. Percent	B. To develop an understanding of percent, the student will be able to:	
	*1. Define percent.	524
	***2. Change a fraction, mixed number, decimal fraction, or ratio to a percent.	541
	***3. Change a percent to a fraction, mixed number, decimal fraction or ratio.	543
	4. Use decimal fractions and fractions to compute with percent.	544
	5. Express a percent as a ratio whose denominator is 100.	545
	6. Express a ratio as a percent, fraction, or decimal.	546
	7. Rename a percent or a decimal as a ratio in lowest terms.	546

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***8. Find a number when a percent of it is known.	548
	***9. Find what percent one number is of another.	550
	10. Solve discount problems.	551
	11. Solve commission problems.	553
	**12. Compute percent of increase and percent of decrease.	554
	**13. Use the formula I=PRT to compute interest.	556
	14. Solve word problems to find the percent of a given number.	710
	15. Solve word problems to find what percent one number is of another.	710
	16. Solve word problems to find a number when a percent of it is known.	710
VI. Squares and Square Root		
A. Squares and Square Root	A. After reviewing squares and square roots, the student will be able to:	
	***1. Compute the square of a one- or two-digit number.	559

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	2. Find the square root of a perfect square less than 225.	562
	3. Find the square of a one-, two- or more digit number.	559
	**4. Identify square roots of numbers that are perfect squares (limit: 1-100).	562
	**5. Use a table to find the square root of a number.	560
	6. Find the square root of a number by using the square root algorithm.	560
VII. Relations and Functions		
A. Graphs	A. To demonstrate the proficiency in working with graphs, the student will be able to:	
	**1. Construct a bar graph from given data.	574
	2. Construct, read, and interpret bar graphs.	574
	**3. Use information from a line graph.	571
	**4. Construct an appropriate graph (pictograph, line graph, circle graph) from given data.	576

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
VIII Measurement and Estimation		
A. Time	A. To demonstrate an understanding of time, the student will be able to:	
	1. Record time - no limit.	592
	***2. Record time to the nearest minute and compute sums or differences in time problems involving hours.	596
	3. Solve word problems involving time in days, weeks, months, or years with conversion.	710
B. Money	B. To demonstrate an understanding of money, the student will be able to:	
	1. Count change to $5.00, $10.00.	601
	2. Multiply and divide money.	603
	***3. Compute problems involving money.	604
	4. Solve two-step word problems involving amounts of money.	710
C. Linear, Liquid and Weight Measure	C. To demonstrate an understanding of linear, liquid and weight, the student will be able to:	
	1. Measure lengths to the nearest mm.	611

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	**2. Determine the appropriate unit to measure length in metric and customary.	612
	**3. Determine the appropriate unit to measure weight (mass) in metric and customary.	616
	**4. Determine the appropriate unit to measure capacity (liquids) in metric and customary.	623
	5. Measure capacity in liters and milliliters.	611
D. Symbols and Conversions	D. To demonstrate an understanding of symbols and conversions, the student will be able to:	
	1. Recognize abbreviations and value of the common units of measurement in the customary system.	625
	2. Recognize the symbols and the value of the common units of measurement in the metric system.	627
	**3. Convert linear, square, capacity, and weight measurements to equivalent measures within the metric system.	630
	**4. Convert linear, square, capacity, and weight measurements to equivalent measures within the customary system.	632

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
E. Computation	E. To demonstrate an understanding of measurement, the student will be able to:	
	**1. Add and/or subtract customary measures with regrouping.	633
	**2. Add and/or subtract metric measures with regrouping.	634
	3. Designate a measurement as a cardinal number and a word telling things counted.	635
	4. Tell which of two given measurements is more precise.	636
	5. Tell the greatest possible error of measurement is one-half the unit used for measuring.	637
	6. Show the maximum length or minimum length of a measurement can be found by respectively adding or subtracting GPE to or from the measurement.	638
	7. Relate temperature in degrees to hot, cold, or comfortable.	639
IX. Geometry		
A. Angles	A. To demonstrate an understanding of angles, the student will be able to:	

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	1. Measure given angles with a protractor correct within two degrees.	664
	2. Find the measure of the third angle of a triangle when given the measures of the other two angles.	665
	3. Identify and use right, congruent, opposite, and alternating angles.	666
	***4. Identify and draw a right angle, an acute angle, and an obtuse angle.	668
	**5. Identify bisector of line segment, bisector of an angle, perpendicular lines, congruent figures.	704
	6. Copy an angle using a straightedge and a compass.	669
	7. Construct and label points, lines, segments, rays, angles, and planes.	670
B. Polygons	B. To demonstrate a knowledge of polygons, the student will be able to:	
	**1. Identify the parts of a right triangle.	692
	**2. Classify a triangle according to sides as isosceles, equilateral, or scalene.	693
	**3. Classify a triangle according to angles as acute, right, obtuse, or equiangular.	695

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	***4. Recognize similar figures.	672
	***5. Identify and classify a quadrilateral as a square, rectangle, parallelogram, trapezoid, or rhombus.	698
	6. Identify and draw plane figures: quadrilateral, parallelogram, rectangle, square, rhombus, pentagon, hexagon, octagon.	700
	7. Identify and use parallel and perpendicular planes.	702
	**8. Compute the perimeter of scalene, isosceles, and equilateral triangles.	675
	**9. Compute perimeter of quadrilaterals (rhombus, parallelogram, trapezoid).	677
	**10. Find the area of a triangle using the formula $A=\frac{1}{2}(b \times h)$.	683
	**11. Find the area of a parallelogram using the formula $A=bh$.	684
	12. Find the area of a trapezoid using the formula $A=\frac{1}{2}h(a+b)$.	685
	13. Recognize regular polygons of ten or less sides.	706

COURSE CONTENT

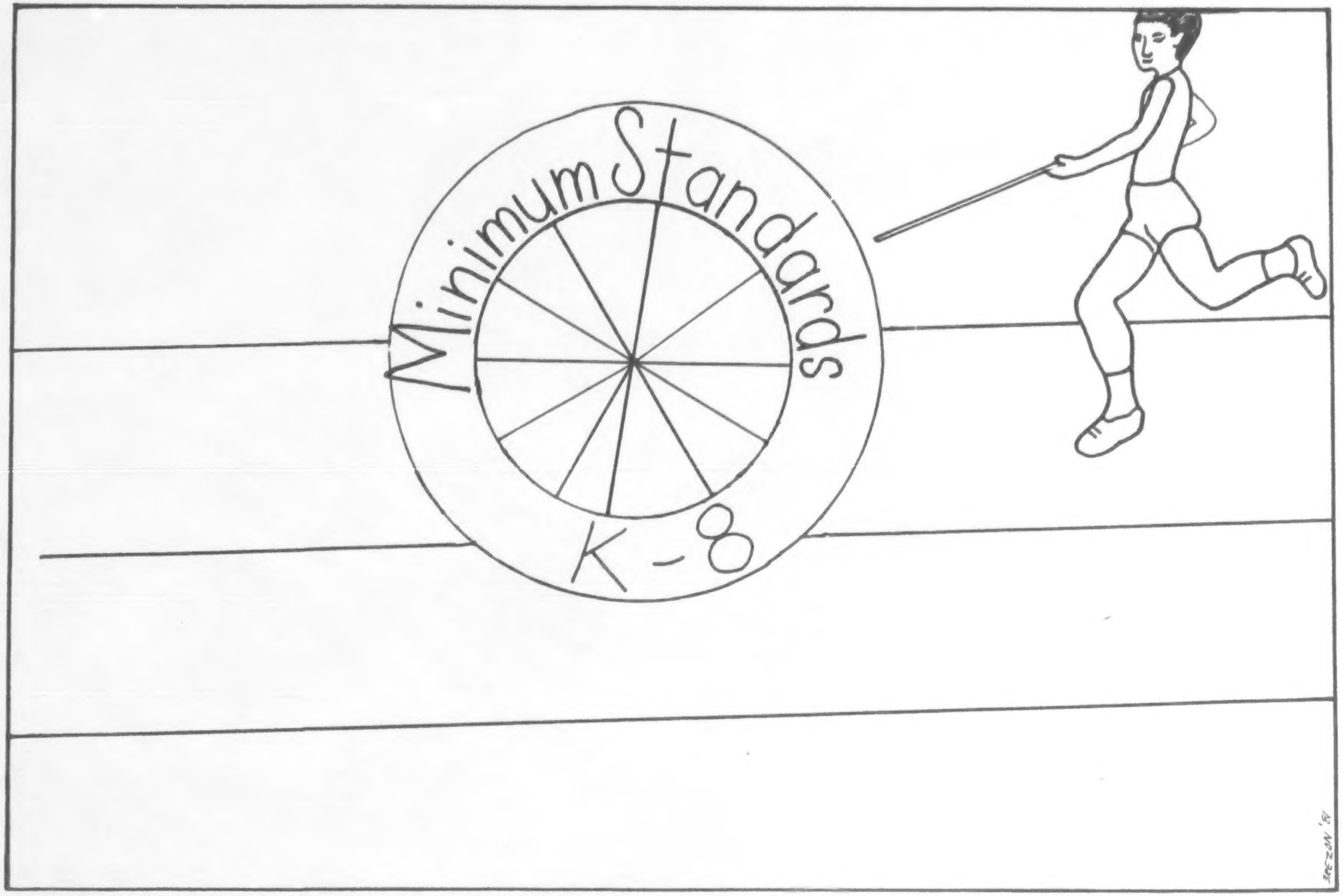
Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	*14. Use the Pythagorean Rule.	708
C. Circles	C. To demonstrate a knowledge of circles, the student will be able to:	
	*1. Identify the parts of a circle: chord, arc.	654
	**2. Compute the circumference of a circle by using the appropriate formula.	679
	**3. Find the area of a circle using the correct formula.	686
D. Solid/Spatial Figures	D. To demonstrate a knowledge of solid/spatial figures, the student will be able to:	
	***1. Identify common spatial figures (cube, pyramid, sphere, rectangular prism, cone, cylinder).	703
	2. Identify and use various formulas for finding surface area of solid figures: prisms, cones, pyramids, cylinders, and spheres.	696
	**3. Compute the volume of a cube and a rectangular prism.	688
	4. Identify and use various formulas for finding volume of solid figures: prisms, pyramids, cylinders, cones, and spheres.	690

COURSE CONTENT

Eighth Grade

Curriculum Outline	Performance Objectives	Activity Page Number
	5. Evaluate a formula for given values: $D=rt$; $I=PRT$; $C=2\pi r$; $A=S^2$; $A=\pi r^2$.	556 578 679 686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MATHEMATICS

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MINIMUM STANDARDS, GRADES K-8

SKILL: I. SETS	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
ALL SKILLS MASTERED AT A GRADE LEVEL SHOULD BE MAINTAINED AT EACH HIGHER LEVEL.										
1. Recognize a set of concrete objects from a given description. (ex.: boys in a classroom, girls in a classroom)	231	***								
2. Identify members (elements) of a set.	229	***								
3. Identify the empty set.	240	*	**	***						
4. Compare the number of members (elements) in two sets indicating which is more or less (set of 5 members or less).	230	***								
5. Identify equivalent and non-equivalent sets.	235	*	***							
6. Match concrete and semi-concrete objects in a one-to-one correspondence (sets with 5 or fewer members).	234	*	***							
7. Recognize related and non-related objects in a collection.	238	*	**	***						
8. Recognize the cardinal number of a set of not more than ten members (elements).	233	***								

*Introduced
**Ongoing
***Mastery

MINIMUM STANDARDS, GRADES K-8

SKILL:	SETS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
9.	Write the cardinal number of a set of not more than ten members (elements).	237	*	***							
10.	Order sets of pictures as designated (sets of not more than 10 members or elements).	239	*	**	***						
11.	Compare and construct sets (one more, one less; limit to sets with 10 or fewer members or elements).	242		*	***						
12.	Match a numeral with the number of members (elements) of a set (sets of 10 or fewer members).	236	*	***							

MATHEMATICS

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**Ongoing
***Mastery

MINIMUM STANDARDS, GRADES K-8

SKILL: II. NUMERATION	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
ALL SKILLS MASTERED AT A GRADE LEVEL SHOULD BE MAINTAINED AT EACH HIGHER LEVEL.										
1. Count concrete objects (1-10).	246	***								
2. Count semi-concrete objects (1-10).	247	***								
3. Count to ten by ones.	249	***								
4. Recognize numbers in sequential order (1-10).	252	***								
5. Recognize numbers in random order (1-10).	253	*	***							
6. Write numbers in sequential order (1-10).	254	*	***							
7. Identify number words (0-10).	284		***							
8. Group concrete and semi-concrete objects in tens (limit to ten groups)	291		*	***						
9. Identify number words for multiples of ten (20-90).	285			*	***					

MATHEMATICS

*Introduced
**Ongoing
***Mastery

MINIMUM STANDARDS, GRADES K-8

SKILL: NUMERATION continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
10. Count to one hundred by tens.	250		*	***						
11. Identify number words eleven through nineteen.	284			*	***					
12. Count to one hundred by ones.	250		*	***						
13. Count to one hundred by fives.	250		*	***						
14. Count to one hundred by twos.	250		*	***						
15. Write to one hundred by tens.	271		*	***						
16. Write to one hundred by ones.	271		*	***						
17. Write to one hundred by fives.	271		*	***						
18. Write to one hundred by twos.	271		*	**	***					
19. Read and write numbers through one thousand.	282			*	***					
20. Read and write numbers through ten thousand.	283				*	***				

MATHEMATICS

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**Ongoing
***Mastery

MINIMUM STANDARDS, GRADES K-8

SKILL: NUMERATION continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
21. Read and write number words through one thousand.	286					*	**	***		
22. Read and write numbers through one hundred thousand.	283					*	***			
23. Read and write numbers through one million.	283						*	***		
24. Recognize place values, ones and tens.	287		*	***						
25. Recognize place value, hundreds.	287			*	***					
26. Recognize place value, thousands.	287				*	***				
27. Recognize place value, hundred thousands.	287					*	***			
28. Recognize place value of decimal numbers through thousandths.	288						*	**	***	
29. Recognize place value, millions.	283						*	***		
30. Read and write number words through ten thousands.	286					*	**	**	**	**
31. Read and write number words through hundred thousands.	286						*	**	**	**

MATHEMATICS

*Introduced
**Ongoing
***Mastery

MINIMUM STANDARDS, GRADES K-8

SKILL:	NUMERATION continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
32.	Read and write number words through millions.	286							*	**	**
33.	Read and write Roman numerals (1-39).	300						*	**	**	**
34.	Round numbers to nearest ten.	303					*	**	***		
35.	Round numbers to nearest one hundred.	303						*	**	***	
36.	Round numbers to nearest one thousand.	303						*	**	**	***
37.	Round numbers to any specified place value through one million.	305							*	**	**
38.	Identify and use ordinal numbers through fifth.	278	*	***							
39.	Identify ordinal numbers through tenth.	278		***							
40.	Use ordinal numbers through tenth.	278		*	***						
41.	Use ordinal numbers through nineteenth.	278			*	***					
42.	Use ordinal numbers through ninety-ninth.	280				*	***				

*Introduced
**Ongoing
***Mastery

MINIMUM STANDARDS, GRADES K-8

SKILL:	NUMERATION continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
43.	Supply missing numbers in a sequence through ten.	257	*	***							
44.	Supply missing numbers in a sequence through one hundred.	260		*	**	***					
45.	Write the number that comes before (after) a given number (1-99).	261		*	**	***					
46.	Supply missing numbers in a sequence through one thousand.	260				*	***				
47.	Supply missing numbers in a sequence through ten thousand.	267				*	***				
48.	Supply missing numbers in a sequence through one hundred thousand.	267					*	***			
49.	Supply missing numbers in a sequence through one million.	267						*	***		
50.	Define and identify the set of integers.	315								*	**
51.	Illustrate integers as points on a number line.	317								*	**
52.	Determine the absolute value of a given integer.	320								*	**

MATHEMATICS

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MINIMUM STANDARDS, GRADES K-8

SKILL: III. WHOLE NUMBER OPERATIONS	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
ALL SKILLS MASTERED AT A GRADE LEVEL SHOULD BE MAINTAINED AT EACH HIGHER LEVEL.										
1. Add basic facts (sums 0-12) using concrete objects.	331		***							
2. Add basic facts (sums 0-10).	335		***							
3. Add basic facts (sums 0-18).	335		*	***						
4. Add three one-digit numbers (sums 0-9).	337		*	***						
5. Add four one-digit numbers.	346			*	***					
6. Add a two-digit number and a one-digit number (no regrouping).	338		*	***						
7. Compute sums to ninety-nine with zero as one of the two addends.	340		*	**	***					
8. Add two two-digit numbers (no regrouping).	341		*	***						
9. Add columns of two-digit numbers (no regrouping).	344			*	***					

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MINIMUM STANDARDS, GRADES K-8

SKILL: WHOLE NUMBER OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
10. Add a three-digit number and a one-digit number (no regrouping).	345			*	***					
11. Add a three-digit number and a two-digit number (no regrouping).	345			*	***					
12. Add a three-digit number and a three-digit number (no regrouping).	345			*	***					
13. Add a two-digit number and a one-digit number, regrouping in ones place only.	347			*	***					
14. Add a two-digit number and a two-digit number, regrouping in ones place only.	347			*	***					
15. Add a three-digit number and a one-digit number, regrouping in ones place only.	347			*	***					
16. Add a three-digit number and a two-digit number, regrouping in ones place only.	347			*	***					
17. Add two three-digit numbers, regrouping in ones place only.	347			*	***					
18. Add three two-digit numbers, regrouping in ones place only.	347			*	***					

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MINIMUM STANDARDS, GRADES K-8

SKILL:	WHOLE NUMBER OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
19.	Add two two-digit numbers, regrouping in tens place only.	348				*	***				
20.	Add a three-digit number and a two-digit number, regrouping in tens place only.	349				*	***				
21.	Add two three-digit numbers, regrouping in tens place only.	350				*	***				
22.	Add a three-digit number and a two-digit number (regrouping).	351				*	***				
23.	Add two three-digit numbers (regrouping).	351					*	***			
24.	Add three three-digit numbers (regrouping).	351					*	***			
25.	Add two four-digit numbers (regrouping).	351					*	***			
26.	Add two five-digit numbers (regrouping).	351					*	***			
27.	Add columns of numbers with five or fewer digits, five or fewer addends.	354							*	***	
28.	Estimate a sum to the appropriate place value.	353						*	**	**	**

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MINIMUM STANDARDS, GRADES K-8

SKILL: WHOLE NUMBER OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
29. Identify the parts of an addition problem.	329		*	**	***					
30. Demonstrate a knowledge of subtraction facts with minuends to ten.	359		*	***						
31. Subtract a one-digit number from a two-digit number (minuends to 18) using concrete objects.	360		*	**	***					
32. Subtract a one-digit number from a two-digit number (minuends to 18) using basic facts.	360		*	**	***					
33. Compute differences to ninety-nine with zero in the subtrahend.	361		*	**	***					
34. Subtract a one-digit number from a two-digit number (no regrouping).	362		*	***						
35. Subtract a two-digit number from a two-digit number (no regrouping).	362		*	***						
36. Subtract a one-digit number from a three-digit number (no regrouping).	366			***						

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SKILL: WHOLE NUMBER OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
37. Subtract a two-digit number from a three-digit number (no regrouping).	366			***						
38. Subtract a three-digit number from a three-digit number (no regrouping).	366			***						
NOTE: THE FOLLOWING SKILLS (39-49) SHOULD INCLUDE EXAMPLES WITH ZEROS IN THE MINUEND.										
39. Subtract a one-digit number from a two-digit number (no regrouping).	362			*	***					
40. Subtract a one-digit number from a two-digit number (regrouping).	367			*	***					
41. Subtract a two-digit number from a two-digit number (regrouping).	367			*	***					
42. Subtract a one-digit number from a three-digit number (regrouping ones).	368				*	**	***			
43. Subtract a one-digit number from a three-digit number (regrouping).	369				*	**	***			

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SKILL: WHOLE NUMBER OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
44. Subtract a two-digit number from a three-digit number (regrouping).	369				*	**	***			
45. Subtract a three-digit number from a three-digit number (regrouping ones).	368				*	**	***			
46. Subtract a three-digit number from a three-digit number (regrouping).	369				*	**	***			
47. Subtract a one-digit number from a four-digit number (regrouping).	368				*	**	***			
48. Subtract a two-digit number from a four-digit number (regrouping).	369				*	**	***			
49. Subtract a three-digit number from a four-digit number (regrouping).	369				*	**	***			
50. Subtract one number from another (minuends limited to 5 digits).	371						*	**	***	
51. Check subtraction by addition.	363			*	**	***				
52. Identify the parts of a subtraction problem.	358			*	***					

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MINIMUM STANDARDS, GRADES K-8

SKILL:	WHOLE NUMBER OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
53.	Multiply two one-digit numbers (products through 36).	374				***					
54.	Multiply two one-digit numbers (products through 81).	374				*	***				
55.	Multiply a two- or three-digit number by a one-digit number (no regrouping).	375				*	***				
56.	Multiply a two-digit number by a one-digit number (no digit greater than 6).	376				*	***				
57.	Multiply a two-digit number by a one-digit number.	376					*	***			
58.	Multiply by ten; one hundred; one thousand.	385						*	***		
59.	Multiply by ten thousand; one hundred thousand; one million.	385							*	**	***
60.	Write powers of ten in exponential form.	387							*	**	**
61.	Multiply a three-digit number by a one-digit number.	381					*	***			
62.	Multiply a two-digit number by a two-digit number.	381						*	***		

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MINIMUM STANDARDS, GRADES K-8

SKILL: WHOLE NUMBER OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
63. Multiply a three-digit number by a two-digit number.	381						*	***		
64. Multiply a three-digit number by a three-digit number.	381						*	**	***	
65. Multiply a four-digit number by any number of four digits or less.	381							*	**	***
66. Identify the parts of a multiplication problem (include factors and products).	373				*	***				
67. Demonstrate a knowledge of division facts (divisors of 6 or less).	392				*	***				
68. Demonstrate a knowledge of division facts.	392					*	***			

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SKILL:	WHOLE NUMBER OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
	NOTE: THE FOLLOWING SKILLS (70-86) SHOULD INCLUDE EXAMPLES WITH ZEROS IN THE QUOTIENT.										
70.	Divide a one-digit number by a one-digit number (with remainder).	398					*	***			
71.	Divide a two-digit number by a one-digit number (no remainder).	399					*	***			
72.	Divide a three-digit number by a one-digit number (no remainder).	399					*	***			
73.	Divide a two-digit number by a one-digit number (with remainder).	400					*	***			
74.	Divide a four-digit number by a one-digit number (no remainder).	399					*	***			
75.	Divide a three-digit number by a one-digit number (with remainder).	402					*	***			
76.	Divide a four-digit number by a one-digit number (with remainder).	402					*	***			

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SKILL:	WHOLE NUMBER OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
77.	Divide by a multiple of ten.	403						*	***		
78.	Divide a two-digit number by a two-digit number (no remainder).	405						*	***		
79.	Divide a three-digit number by a two-digit number (no remainder).	405						*	**	***	
80.	Divide a four-digit number by a two-digit number (no remainder).	405						*	**	***	
81.	Divide a two-digit number by a two-digit number (with remainder).	405						*	**	***	
82.	Divide a three-digit number by a two-digit number (with remainder).	405						*	**	***	
83.	Divide a four-digit number by a two-digit number (with remainder).	405						*	**	***	
84.	Divide a five-digit number by a two-digit number (with remainder).	405						*	**	***	
85.	Divide by multiples of one hundred.	410							*	**	**

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SKILL:	WHOLE NUMBER OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
86.	Divide a number of more than three digits by a three-digit number.	411							*	**	**
87.	Check division by multiplication.	401					*	**	**	**	**
88.	Identify the parts of a division problem.	391				*	**	***			
89.	Estimate products and/or quotients.	414 415								*	**
90.	Express remainders as fractions.	407						*	***		
91.	Add and subtract integers.	321 322								*	**
92.	Multiply and divide integers.	324 325									*

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MINIMUM STANDARDS, GRADES K-8

SKILL:	IV. FRACTIONS AND OPERATIONS	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
	ALL SKILLS MASTERED AT A GRADE LEVEL SHOULD BE MAINTAINED AT EACH HIGHER LEVEL.										
1.	Recognize one-half of a concrete object.	420	***								
2.	Recognize one-third and one-fourth of a concrete object.	420		*	***						
3.	Identify the fractions one-half, one-third and one-fourth.	421		*	***						
4.	Read and write the symbol for the fractional part of a region (limit: 1/2, 1/3, 1/4).	423			*	***					
5.	Shade in fractional part (1/2, 1/3, 1/4) of a given figure.	424			*	***					
6.	Identify the fractional part (1/5, 1/6) of a whole.	426				*	***				
7.	Identify the fractional part (1/8, 1/10) of a whole.	426					*	***			
8.	Identify the common fraction that represents the shaded area of a gridded figure when compared to total area (2/5, 3/5, 3/8, 5/8, 7/8).	446						*	**	***	
9.	Identify the parts of a fraction.	428				*	***				

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MINIMUM STANDARDS, GRADES K-8

SKILL: FRACTIONS AND OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
10. Add two simple fractions with like denominators (no regrouping).	436					*	***			
11. Subtract two simple fractions with like denominators (no regrouping).	438					*	***			
12. Identify: proper fraction, improper fraction and mixed numbers.	439					*	**	**	**	**
13. Add mixed numbers with like denominators (no regrouping, no renaming in the sum).	441					*	***			
14. Subtract mixed numbers with like denominators (no regrouping, no renaming in difference).	443					*	***			
15. Continue consecutive equivalent pattern of fractions. (ex.: 1/2, 2/4, 3/6, 4/8,...)	447						*	***		
16. Determine the greatest common factor of numbers.	449						*	**	***	
17. Rename fractions in simplest terms.	451						*	**	***	
18. Rename fractions in higher terms.	452						*	**	***	

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SKILL:	FRACTIONS AND OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
19.	Rename mixed numbers and/or whole numbers as improper fractions.	453						*	**	***	
20.	Rename improper fractions as a mixed number and/or whole number.	454						*	**	***	
21.	Add fractions with like denominators (renaming sums).	458						*	**	***	
22.	Subtract fractions with like denominators (renaming difference).	460						*	**	***	
23.	Multiply two proper fractions.	470						*	**	***	
24.	Multiply a whole number by a proper fraction.	469						*	**	***	
25.	Multiply a mixed number by a proper fraction.	471						*	**	**	***
26.	Multiply a whole number by a mixed number.	472						*	**	**	***
27.	Multiply two mixed numbers.	474						*	**	**	***
28.	Identify the multiplicative inverse.	475						*	**	***	
29.	Divide a proper fraction by a proper fraction.	475						*	**	***	

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SKILL:	FRACTIONS AND OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
30.	Divide a whole number by a proper fraction.	475						*	**	***	
31.	Divide a proper fraction by a whole number.	475						*	**	***	
32.	Divide a mixed number by a proper fraction.	477						*	**	**	***
33.	Divide a proper fraction by a mixed number.	477						*	**	**	***
34.	Divide a mixed number by a mixed number.	478						*	**	**	***
35.	Determine the least common multiple (LCM) of two or more numbers.	456						*	**	***	
36.	Rename fractions with unlike denominators to fractions with common denominators.	457						*	**	***	
37.	Add fractions with unlike denominators.	459						*	**	***	
38.	Subtract fractions with unlike denominators.	462						*	**	***	
39.	Add mixed numbers with unlike denominators.	461						*	**	***	

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SKILL: FRACTIONS AND OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
40. Subtract a fraction from a whole number.	464						*	**	***	
41. Subtract mixed numbers with like denominators (regrouping).	465						*	**	**	***
42. Subtract mixed numbers with unlike denominators (no regrouping).	468						*	**	***	
43. Subtract mixed numbers with unlike denominators (regrouping).	465						*	**	**	***

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SKILL:	V. DECIMALS AND DECIMAL OPERATIONS	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
	ALL SKILLS MASTERED AT A GRADE LEVEL SHOULD BE MAINTAINED AT EACH HIGHER LEVEL.										
	NOTE: USE HORIZONTAL AND VERTICAL FORMS TO WRITE PROBLEMS.										
1.	Read and write decimals through hundredths.	485					*	***			
2.	Add and subtract decimals through hundredths.	501 503					*	***			
3.	Read and write decimals through thousandths.	485						*	***		
4.	Add decimals through thousandths.	501						*	***		
5.	Subtract decimals through thousandths.	503						*	***		
6.	Multiply a whole number (limit: 3 digits) by a decimal (limit: thousandths).	504						*	**	***	
7.	Round decimals to tenths; hundredths; thousandths.	493							*	***	
8.	Multiply a decimal by a decimal (limit: thousandths).	505							*	***	

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SKILL:	DECIMALS AND DECIMAL OPERATIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
9.	Divide decimals (limit: 5-digit dividends, 3-digit divisors).	509							*	**	**
10.	Identify decimals equivalent to: 1/2, 1/4, 3/4, 1/5-4/5, 1/10-9/10, 1/100-99/100.	489					*	***			
11.	Identify decimals equivalent to: 1/3, 2/3, 1/6-5/6, 1/8-7/8.	492						*	***		
12.	Change a common fraction to an equivalent decimal fraction.	513							*	**	***
13.	Change a decimal fraction to an equivalent common fraction.	515								*	***

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SKILL: VI. PERCENT, RATIO, PROPORTION	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
ALL SKILLS MASTERED AT A GRADE LEVEL SHOULD BE MAINTAINED AT EACH HIGHER LEVEL.										
1. Identify the percent sign.	524					*	***			
2. Define percent.	524						*	**	**	**
3. Change a decimal to a percent.	536						*	**	***	
4. Change a percent to a decimal.	536						*	**	***	
5. Change common fractions with denominators of two, three, four, five, eight, ten, twenty, twenty-five, fifty, and one hundred to percents.	537						*	**	***	
6. Find the percent of a given number.	539						*	**	***	
7. Change a mixed number to a percent.	541							*	**	***
8. Change a percent to a mixed number.	543							*	**	***
9. Find what percent one number is of another.	550							*	**	***

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SKILL:	PERCENT, RATIO, PROPORTION continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
10.	Find a number when a percent of it is known.	548							*	**	***
11.	Find the percent of increase.	554								*	**
12.	Find the percent of decrease.	554								*	**
13.	Use the formula (I=PRT) to compute Simple Interest.	556								*	**
14.	Express a ratio of two numbers. (Include the comparison of a shaded area of a given figure to the total area.)	528						*	**	**	**
15.	Identify the parts (terms) of a proportion and solve for the missing term(s).	533						*	**	**	**

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SKILL:	VII. SQUARES AND SQUARE ROOT	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
	ALL SKILLS MASTERED AT A GRADE LEVEL SHOULD BE MAINTAINED AT EACH HIGHER LEVEL.										
1.	Find the square of a one- or two-digit number.	559							*	**	***
2.	Identify square roots of numbers that are perfect squares (limit: 1-100).	562								*	**
3.	Use a table to find the square root of a number.	560								*	**

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SKILL:	VIII. RELATIONS AND FUNCTIONS	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
	ALL SKILLS MASTERED AT A GRADE LEVEL SHOULD BE MAINTAINED AT EACH HIGHER LEVEL.										
1.	Identify a position with reference to a given location (over-under, left-right).	273	*	**	***						
2.	Compare the position of objects with reference to a given location (nearer-farther).	273	*	**	***						
3.	Identify and use the symbols +, =, -.	294		*	***						
4.	Recognize the symbol for greater than (>) and less than (<).	296		*	**	**	***				
5.	Apply the following mathematical symbols correctly (>, < , =, +, -, x, ÷ , ≠).	298				*	***				
6.	Recognize zero as the numerical equivalent of the empty set.	274		*	**	***					
7.	Use zero as the identity element in addition.	275		*	**	***					
8.	Compare the numbers, zero to ninety-nine, using "greater than, less than."	296		*	**	***					

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SKILL:	RELATIONS AND FUNCTIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
9.	Use one as the identity element in multiplication.	276				*	***				
10.	Give groups of numbers and specified operation, determine the equality relation between them (>, =, <).	299					*	**	***		
11.	Interpret data presented in pictorial form.	568				*	***				
12.	Interpret simple data from a simple bar graph.	570					*	**	***		
13.	Construct a bar graph from given data.	574						*	**	**	**
14.	Interpret data from simple line graphs, pictographs, or circle graphs.	570							*	***	
15.	Use information from a line graph.	571								*	**
16.	Construct an appropriate graph (pictograph, line graph, circle graph) from given data.	576								*	**
17.	Collect data and construct a bar or line graph.	571 574									*
18.	Supply the missing numbers in a sequence of odd or even numbers (0-50).	264		*	**	***					

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SKILL:	RELATIONS AND FUNCTIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
19.	Supply the missing numbers in a sequence of odd or even numbers (51-99).	264			*	***					
20.	Supply the missing numbers in a sequence of odd and even numbers (100-[illegible],000).	265				*	***				
21.	Supply the missing numbers in a sequence of numbers that are multiples of five or ten (limit: 100).	266				*	***				
22.	Recognize numbers that are divisible by five.	394				*	**	***			
23.	Recognize that division by zero is not possible.	395					*	***			
24.	Supply the missing number in a whole number sequence which requires either addition or subtraction.	268								*	**
25.	Supply the missing number in a whole number sequence which requires multiplication and/or division.	268								*	**
26.	Order fractions with one-digit denominators.	482							*	**	**
27.	Order fractions with two-digit denominators.	482								*	**

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SKILL:	RELATIONS AND FUNCTIONS continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
28.	Order decimals (limit: hundredths).	496					*	**	***		
29.	Order decimals (limit: thousandths).	496-8						*	**	**	***
30.	Order decimals.	498								*	**
31.	Identify prime numbers less than one hundred.	308						*	**	***	
32.	Solve a simple linear equation of one unknown whose root is a whole number (two-step solution).	416								*	**
33.	Rename numbers given in exponential form such as 5^2, 6^3, 3^4, 10^5	292								*	**
34.	Rename numbers using scientific notation.										

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SKILL:	IX. MEASUREMENT AND ESTIMATION	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
	ALL SKILLS MASTERED AT A GRADE LEVEL SHOULD BE MAINTAINED AT EACH HIGHER LEVEL.										
1.	Relate concepts of time to events (morning, noon, night).	587	*	**	***						
2.	Name the days of the week and months of the year.	585	*	**	***						
3.	Use the calendar to determine the day of the week, the month, and the year of a given date.	589		*	**	***					
4.	Identify the following coins: cent, nickel, dime, and quarter.	597	***								
5.	Recognize the monetary value of cent, nickel, dime, and quarter.	599		*	**	***					
6.	Identify the ¢ symbol.	599			***						
7.	Associate the ¢ symbol with the value of cent, nickel, dime, and quarter.	599			***						
8.	Write the value of money using the $ and the . (decimal point); e.g., $2.00.	600				*	***				
9.	Count change (limit: $1.00).	601				*	***				

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SKILL:	MEASUREMENT AND ESTIMATION continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
10.	Identify the smaller or larger object (limit: two objects).	578	***								
11.	Identify objects that are the same or that are different.	579	***								
12.	Identify shorter or longer line segments (limit: two).	580	*	***							
13.	Identify lighter or heavier objects (concrete).	582	*	***							
14.	Identify the hour and minute hands on the clock.	588		*	***						
15.	Tell time on the hour.	588		*	***						
16.	Tell time on the half-hour.	588		*	**	***					
17.	Tell time to the nearest five minute interval.	594				*	**	***			
18.	Tell time to the nearest minute.	595				*	**	**	***		
19.	Record time (limit: to hour and half-hour; use colon notation, e.g., 12:30).	591			*	***					

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MINIMUM STANDARDS, GRADES K-8

SKILL:	MEASUREMENT AND ESTIMATION continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
20.	Identify the centimeter and meter as units of metric (SI) linear measure.	606			*	***					
21.	Measure lengths using centimeters.	608			*	***					
22.	Measure lengths using the meter.	609			*	**	***				
23.	Measure volume in liters.	621			*	**	***				
24.	Measure a weight (mass) in grams and kilograms.	615				*	**	***			
25.	Identify the inch and the foot as units of customary linear measure.	605		*	***						
26.	Measure lengths to nearest inch.	607			*	***					
27.	Measure length to nearest half inch, foot, yard.	607				*	***				
28.	Recognize the cup, pint, and the quart as units of customary liquid measure.	618		*	**	***					
29.	Measure liquid to the nearest cup, pint, quart, half gallon and gallon.	619				***					

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SKILL: MEASUREMENT AND ESTIMATION continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
30. Measure weight in pounds.	613				***					
31. Measure weight in ounces.	614				*	***				
32. Read a thermometer - Celsius and/or Fahrenheit.	617				*	**	**	***		
33. Determine the appropriate unit to measure length in metric (SI) and customary systems.	612					*	**	**	**	**
34. Determine the appropriate unit to measure capacity (liquids) in metric (SI) and customary systems.	623					*	**	**	**	**
35. Determine the appropriate unit to measure weight (mass) in the metric (SI) and the customary systems.	616						*	**	**	**
36. Convert linear measures:										
Metric (SI) - centimeters to meters, meters to centimeters;	630						*	**	**	**
Customary - inches to feet to yards; yards to feet to inches	632						*	**	**	**
NOTE: NO CONVERSION BETWEEN UNITS OF THE METRIC (SI) SYSTEM AND UNITS OF THE CUSTOMARY SYSTEM IS DESIRED.										

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MINIMUM STANDARDS, GRADES K-8

SKILL:	MEASUREMENT AND ESTIMATION continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
37.	Convert square measures:										
	Metric (SI) - cm^2 to m^2; m^2 to cm^2	630						*	**	**	**
	Customary - sq. in. to sq. ft. to sq. yds.; sq. yds. to sq. ft. to sq. in.	632						*	**	**	**
*	See note following skill 36.										
38.	Convert capacity (liquid) measures:										
	Metric (SI) - milliliters to liters; liters to milliliters	622						*	**	**	**
	Customary - cups to pints to quarts to gallons; gallons to quarts to pints to cups	632						*	**	**	**
*	See note following skill 36.										
39.	Convert weight (mass) measures:										
	Metric (SI) - milligrams to grams to kilograms; kilograms to grams to milligrams	630							*	**	**
	Customary - ounces to pounds; pounds to ounces	632							*	**	**
*	See note following skill 36.										

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MINIMUM STANDARDS, GRADES K-8

SKILL:	MEASUREMENT AND ESTIMATION continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
40.	Measure a length to nearest one-quarter and/or one-eighth of an inch.	607							*	***	
41.	Add or subtract measurements of length, weight, or capacity using the customary system.										
	Length - inches, feet, yards									*	**
	Weight - ounces, pounds									*	**
	Capacity - cups, pints, quarts	633								*	**
42.	Add or subtract measurements of length, weight (mass) or capacity using the metric (SI) system.										
	Length - meters, centimeters									*	**
	Weight (mass) - kilograms, grams									*	**
	Capacity - liters, milliliters	634								*	**
43.	Compute the answers to problems involving money.	604					*	**	**	**	***
44.	Recognize and use ratios in map reading.	529								*	**
45.	Recognize and use π in fraction (22/7) or decimal (3.14) form.	679 686						*	**	***	

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MINIMUM STANDARDS, GRADES K-8

SKILL: MEASUREMENT AND ESTIMATION continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
46. Measure angles using a protractor (less than 180^o).	663						*	**	***	
47. Compute sums and differences in time problems involving hours and minutes.	596							*	**	***

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MINIMUM STANDARDS, GRADES K-8

SKILL: X. GEOMETRY	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
ALL SKILLS MASTERED AT A GRADE LEVEL SHOULD BE MAINTAINED AT EACH HIGHER LEVEL.										
* METRIC (SI) AND CUSTOMARY UNITS SHOULD BOTH BE USED.										
1. Identify a circle, triangle, square and rectangle.	643	*	***							
2. Classify objects or pictures according to color and shape.	645 646	*	***							
3. Associate the words circle, triangle, square, and rectangle with their visual representation.	648		*	**	***					
4. Draw a facsimile of these two-dimensional geometric figures: circle, triangle, square, rectangle.	649			*	***					
5. Identify and draw representations of points, lines, segments, and rays.	650				*	***				
6. Identify perimeter and determine by counting the units along each of the sides of a two-dimensional figure.	674					***				
7. Compute the perimeter of a square, rectangle, and triangle.	673					*	***			

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SKILL:	GEOMETRY continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
8.	Identify the area of a square and a rectangle by counting square units enclosed.	680					***				
9.	Compute the area of a square and a rectangle using the appropriate formula.	681						*	***		
10.	Identify the parts of a circle (center, radius, diameter, circumference, semi-circle).	652					*	***			
11.	Identify pairs of intersecting and parallel lines.	656					*	**	***		
12.	Identify an angle, the parts of an angle and a right angle.	661					*	**	***		
13.	Identify types of quadrilaterals (trapezoids, parallelograms, rhombus).	698						*	**	**	***
14.	Identify common spatial figures (cube, pyramid, sphere, rectangular prism, cone, cylinder).	703						*	**	**	***
15.	Identify horizontal and vertical lines.	657						*	***		
16.	Identify perpendicular lines.	658						*	**	***	

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MINIMUM STANDARDS, GRADES K-8

SKILL:	GEOMETRY continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
17.	Classify angles (acute, obtuse, right, straight).	668						*	**	**	***
18.	Classify triangles according to sides (scalene, isosceles, equilateral).	693								*	**
19.	Compute the perimeter of triangles (scalene, isosceles, equilateral).	675								*	**
20.	Compute the perimeters of quadrilaterals (parallelograms, rhombus, trapezoid).	677								*	**
21.	Compute the volume of a cube and a rectangular prism.	688						*	**	**	**
22.	Identify the altitude and base of a triangle and a parallelogram.	682							*	***	
23.	Classify triangles according to their angles.	695								*	**
24.	Identify the parts of a right triangle.	692								*	**
25.	Compute the area of a triangle.	683								*	**
26.	Compute the area of a parallelogram.	684								*	**

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MINIMUM STANDARDS, GRADES K-8

SKILL: GEOMETRY continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
27. Compute the circumference of a circle using the formula $C = 2\pi r$.	679								*	**
28. Compute the area of a circle using the formula $A = \pi r^2$.	686								*	**
29. Recognize congruent figures.	671							*	***	
30. Recognize similar figures.	672								*	***
31. Identify these parts of a circle (chord, arc).	654									*
32. Identify regular polygons of ten or less sides.	706									*
33. Identify the following basic geometric constructions (bisector of line segment, bisector of an angle, perpendicular lines, congruent figures).	704								*	**
34. Use the Pythagorean Rule.	708									*

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MINIMUM STANDARDS, GRADES K-8

SKILL: XI. PROBLEM SOLVING	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
ALL SKILLS MASTERED AT A GRADE LEVEL SHOULD BE MAINTAINED AT EACH HIGHER LEVEL AND EXTENDED AS APPROPRIATE AT EACH HIGHER LEVEL.										
1. Combine the members (elements) of a set of concrete objects (sums of 5 members or elements).	244	*	***							
2. Combine the members (elements) of a set of semi-concrete objects (sums of 5 members of elements).	244	*	***							
3. Add members to make a set to contain a specified number of members (limited to 5 members).	330	*	***							
4. Repeat a pattern from a given sequence.	258	*	***							
5. Solve word problems, using addition or subtraction (limit: sums through 10, minuends of 10).	710		***							
6. Choose the addition or subtraction sentence to solve a word problem (limit: sums of 10, minuends of 10).	710		*	**	***					
7. Supply the answer to an oral addition or subtraction problem (limit: sums of 10, minuends of 10).	710		*	***						

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MINIMUM STANDARDS, GRADES K-8

SKILL:	PROBLEM SOLVING continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
8.	Write number sentences for pictured action (addition and/or subtraction (limit: sums of 10, minuends of 10).	710	*	***							
9.	Identify the operation (addition or subtraction) to use to solve a simple word problem (limit: sums of 18, minuends of 18).	710			*	***					
10.	Solve word problems using multiplication with no factor greater than six.	710			*	***					
11.	Solve word problems using addition and subtraction (sum less than 100, minuends less than 100).	710			*	***					
12.	Solve two-step word problems using addition, subtraction and/or multiplication.	710				*	**	***			
13.	Solve two-step word problems involving amounts of money not exceeding ten dollars.	710				*	**	***			
14.	Solve word problems involving time in hours only and in minutes only.	710				*	**	***			
15.	Solve word problems involving time in days, weeks, months or years (no conversion).	710				*	**	***			

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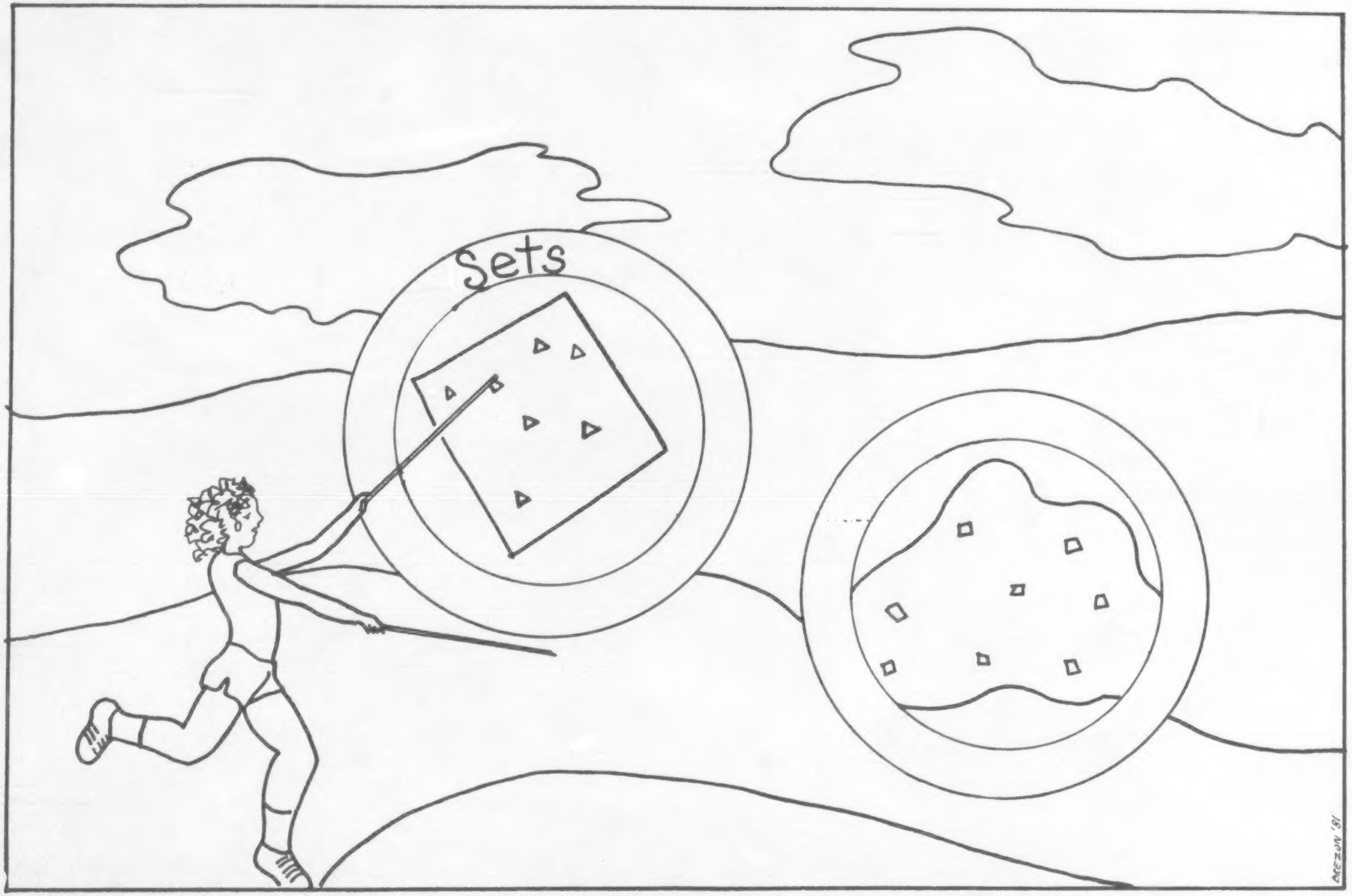
MINIMUM STANDARDS, GRADES K-8

SKILL:	PROBLEM SOLVING continued	ACTIVITY PAGE NUMBER	K	1	2	3	4	5	6	7	8
16.	Solve word problem involving weight - units of pounds only or ounces only (no conversion).	710				*	***				
17.	Compute the average on not more than five numbers, each with a maximum of three digits.	417								***	
18.	Evaluate a formula for given values: $D = rt$; $I = PRT$; $C = 2\pi r$; $A = s^2$; $A = \pi r^2$.	556 578 679 686									
19.	Solve consumer related problems in the following categories: a. Commission selling b. Planning a trip c. Comparison shopping d. Home ownership e. Budgeting f. Banking and related procedures g. Installation purchases h. Balancing a checkbook										
20.	Solve job related problems in the following categories: a. Hourly rate, overtime pay b. Income tax, Federal and State c. Social Security (FICA) d. Workmen's Compensation										



474

475

CONTENT: Sets

OBJECTIVE: The student will be able to identify and describe a set. K

ACTIVITIES

1. To help children think about sets in their personal lives, have them make scrapbooks by cutting out sets of pictures to represent members of the family (including themselves), pets, homes, furniture, clothes, toys, cars, etc.

   Materials: Old magazines, catalogs, paper, paste, scissors

2. Have one child place a set of objects in the sack and give hints about what is in the sack until someone guesses what the set is.

   Materials: Sack, familiar classroom objects (erasers, crayons, chalk, scissors, pencils)

3. Display a number of different sets. Have the students close their eyes and remove one set. Ask the students to open their eyes and tell which set disappeared. For variation, add a set while the students have their eyes closed and ask them to tell which set appeared.

   Materials: Sets of objects, such as paintbrushes, toy cars, juice cans, dolls, blocks, or a flannelboard and felt cutouts such as chicks, rabbits, hearts, leaves, etc.

CONTENT: Sets

OBJECTIVE: The student will be able to identify members (elements) of a set. K *K

ACTIVITIES

1. Have several children play a "Find a Set" game. Ask each child to select a set, tell what it is, and name its members. Begin with an example: "I have chosen a set of toys. The members of this set are a truck, a wrecker, and a doll. Dale, show us your set and tell us about it."

2. Involve a few children at a time in making sets. Use small items which may be handled easily. Ask the children to select a set of:

   a. things that are hard
   b. things that roll
   c. things that are soft
   d. things that make noise

   Give each cild a piece of colored yarn and ask him to circle his set with it. Let the children tell about their sets, classify them, and identify the members.

   Now ask the children if other things could be members of the set. Would a pony be a member of the set of things that roll? Would a baseball be a member of a set of things that are soft? Let the children name other things which would or would not be members of the different sets they have made.

   Materials: Small items for sets, yarns

3. Make cards showing sets of objects. On each card, include four objects with a common attribute or function and one object that does not belong to the set. Have the student tell which object does not belong in each set and explain why.

   Materials: Tagboard, pictures cut from magazines or catalogs

CONTENT: Sets

OBJECTIVE: The student will compare the number of members in two sets indicating which is more or less (set of 5 members or less). K *K

ACTIVITIES

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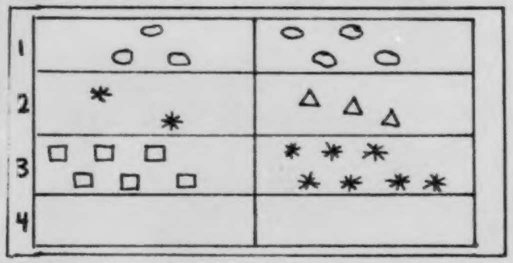
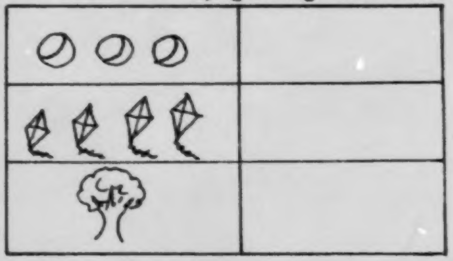
1. Provide a worksheet similar to the one below.



Have students get out a red and a blue color. Direct them to put a red X over the set that contains more and a blue circle over the set that contains less. Do several of these together to make sure the students understand the concept of more and less.

2. Provide students with a work sheet similar to the one below. Next to each picture of a given set is an empty one. Have students form a set with one more in this area. This may be done by drawing or cutting and pasting pictures from magazines.

Use the worksheet a second time, giving the directions for the concept of less.



3. Provide students with 10-20 objects such as checkers, buttons or blocks. Make a set of three objects on the chalkboard or flannelboard. Have students make a set containing the same number on their desks by using the objects. Then have them make a set containing more than three. Continue this activity using the concept of less.

430

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CONTENT: Sets

OBJECTIVE: The student will be able to recognize concrete objects from a given description. K *K

ACTIVITIES

1. Dictated statements by the teacher to encourage responses from pupils are very useful. Some examples include:

    a. The set of all children in the room wearing red sweaters
    b. The set of all children in the room
    c. The set of all boys in the room
    d. The set of all tricycles with five wheels
    e. The set of all green crayons in the box

    Ask the children to think of statements to dictate for group response. Allow the children to create sets to place on the flannelboard; then ask other children to describe the set picture.

2. Use the chalkboard or overhead projector and sketch very simple sets for children to describe. Felt cutouts with wool yarn enclosing sets can be used on the flannelboard to encourage description of sets.

    Materials: Chalkboard or overhead projector

3. Ask the children to describe a set with these members:

    a. dog, cat, rabbit (animals)
    b. January, February, March (months of the year)
    c. a, b, c, d (letters of the alphabet)
    d. apple, orange, banana (fruit)

483

482

CONTENT: Sets

OBJECTIVE: The student will be able to manually arrange concrete and semi-concrete objects in a one-to-one correspondence. K-1

ACTIVITIES

1. Provide each student with two, three, or four tongue depressors and the same number of different colored crayons. The student is to match one tongue depressor with each color. Then have the student color one side on the stick with the crayon which it matches. Repeat this activity with a different number of tongue depressors and crayons.

2. Make 36 blank playing cards. On the cards draw sets of objects for the numerals 0-5. Make six cards for each number. Play the game like Concentration. Place the cards down in six rows. The player turns over two cards. If the cards match, the player keeps the cards and takes another turn. If the cards don't match, turn the cards face down again. Play until all cards have been matched. The winner is the player with the most cards.

3. Provide each child with a number of beans and a number of buttons. Have the students make the group of beans have the same number as the buttons by matching one-to-one.

CONTENT: Sets

OBJECTIVE: The student will be able to recognize the cardinal number of a set of not more than 10 members (elements). K *K

ACTIVITIES

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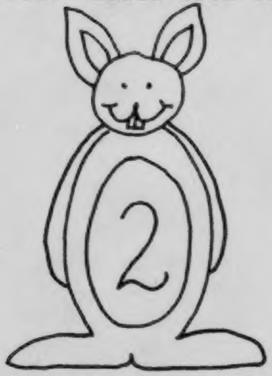
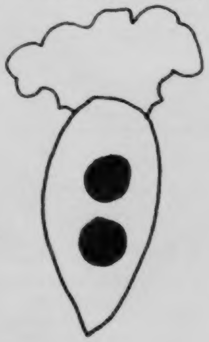
1. Ricky Rabbit loves carrots, but he is fussy about the carrots he will eat. He will only eat the carrots that have the number set that matches the number on his belly. Can you help him find the correct carrots? Match each rabbit to the correct carrot. Hurry, because Ricky is very hungry and he becomes very grumpy when he is hungry.

   Materials: Ten copies of the rabbit and ten carrots. Label the rabbits with the numbers from one to ten. Label each carrot with a corresponding number set.





2. Provide a set of small containers with numerals written on them. Children may use tongue depressors, straws, or ice cream sticks to represent the numbers indicated by the numerals on the side of the containers.

   Materials: Ten cans or containers, tongue depressors, straws, or ice cream sticks

3. Make paper plates to illustrate sets from 1-10 objects. Cut the plates in half in different ways so that each half only fits its mate. Have the children match the number to the correct set of objects.

   Materials: Paper plates, cut-outs from magazines

CONTENT: Sets

OBJECTIVE: The student will be able to visually match concrete and semi-concrete objects in one-to-one correspondence. K-1 *1

ACTIVITIES

1. Use sections of egg cartons and counters. Cut off four compartments and have the children place four counters, one in each compartment.

2. Give each child six large square-shaped pieces of red construction paper and a large strip of yellow paper marked off into six large squares. Have the children cut out the squares and match them to see if they have as many yellow squares as red squares.

3. Display a row of five chairs. Ask five children to stand near the row of chairs. Ask questions such as "Are there more children than chairs? How can we show that the number of chairs and the number of children are the same?" (One child could sit in each chair, etc.)

CONTENT: Sets

OBJECTIVE: The learner will be able to identify equivalent and non-equivalent sets. K-1 *1

ACTIVITIES

1. Give each child two groups of counters. (Example: 5 blue, 5 yellow, 3 red, 2 purple). Have the children match the counters of one color with those of another to see if there are the same number of counters in each group.

2. Pairs of children may take turns naming two sets found in the classroom. One child picks the sets while the other child tells if they have the same number of members or a different number of members. The activity may be repeated with three sets, having the child tell which set has the most members and which has the fewest.

3. Place two groups of objects on the flannelboard. Have the children match each object in one group with one from the other by placing strips of felt reaching from one object to another. Ask the questions, "Do the sets have the same number of members? Are the sets equal? Are the sets different?"

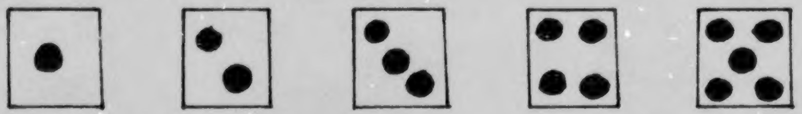
CONTENT: Sets

OBJECTIVE: The student will be able to match a numeral with the number of members of a set. (Sets of 10 or less) K-1 *1

ACTIVITIES

1. Play the game "Secret Number." Whisper the number 4 (or draw a word card from pile) to a child. The child chooses that number of counters from a box, displays them to the other children, and asks, "What is the secret number?" The child who is chosen to respond says, "The secret number is 4 because you have four counters," and writes the numeral on the chalkboard. Play the game several times.

2. Give each child ten blank cards. Have the children make dot cards for the numbers 1 through 5. Example:



On the remaining five cards, have the children write the numerals 1 through 5. Let the children use the cards for a match game. They may play individually, in pairs or in small groups.

3. Place cutout numerals 1, 2, and 3 in a row on the flannelboard. Direct a child to place 1, 2, or 3 cutouts above the numerals. Have another child use yarn to ring the correct numeral for the set the child has made. Repeat the activity.

CONTENT: Sets

OBJECTIVE: The student will write the cardinal numbers of a set of not more than 10 members. K-1 *1
The student will be able to write the cardinal numbers of a set. 1-2

ACTIVITIES

1. Provide writing or drawing paper and pencils or crayons for children. Have a child place a number of objects (from 1 to 6) on the display board. Other children are to write the numerals that tell how many. The child placing the objects then writes the correct numeral so that all children may check their work. This kind of activity can be used independently by small groups while you and other children are involved in a different kind of exercise.

2. Provide each student with six paper cups. In each cup there are either zero, one, two, three, four, or five objects. The student is to pick a cup and determine the number of objects in the cup. Then the student is to write the numeral that names the number of objects as many times as possible on the first row of his practice paper. The student continues this activity for the objects in every cup, using a different row each time. You might write the correct numeral on the bottom of each cup so that the student can check his work.

3. On the chalkboard draw groups of objects. Have a child name the number in the group and another child write the number on the chalkboard.

CONTENT: Sets

OBJECTIVE: The student will be able to recognize related and non-related objects in a collection. K-2 *2

ACTIVITIES

1. Have the children draw a picture of the members of their family.

2. Provide the child with two or more sets of pictures, such as kinds of toys, fruit, animals. Mix the pictures and encourage the child to sort these into different sets of the same kinds of things.

3. Children may be used as members of sets to be described, as a set of boys, a set of girls, a set of children with brown hair. A set may also have unrelated members such as one boy and one girl, three children with brown hair and one with blonde hair. Ask the children which member does not belong.

CONTENT: Sets

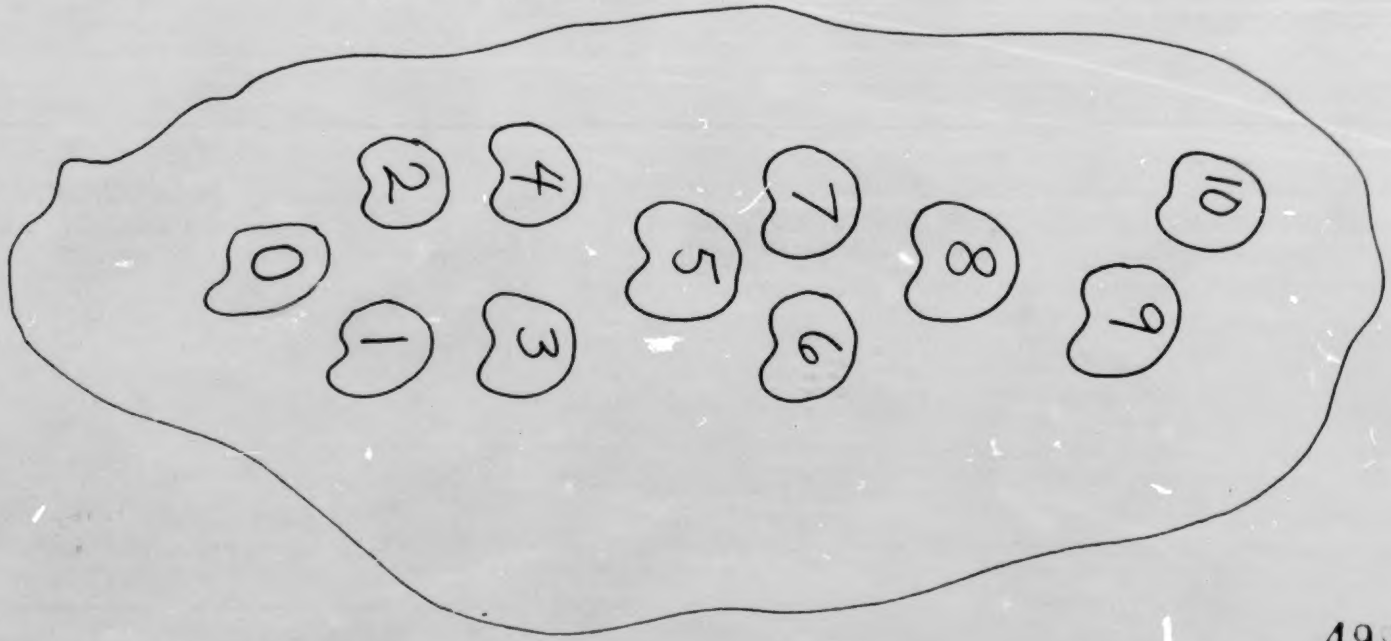
OBJECTIVE: The student will be able to order sets of pictures in designated order. (Sets of 10 or less elements) K-2 *2

ACTIVITIES

1. Give the children lined paper and have them draw one large dot on the first line, two on the second, and so on to ten large dots. Have them write the number beside each row.

2. The student can place the correct number of beans in saucers labeled 1-10 and then place the saucers in order.

3. Cut pieces of cardboard to resemble lily pads. Number the lily pads from 0-10. Draw a lake or river on the floor or let the children use their imagination. Place the lily pads in the lake in order from 0-10. Let the children pretend they are frogs. Whoever takes a step out of order falls into the lake.



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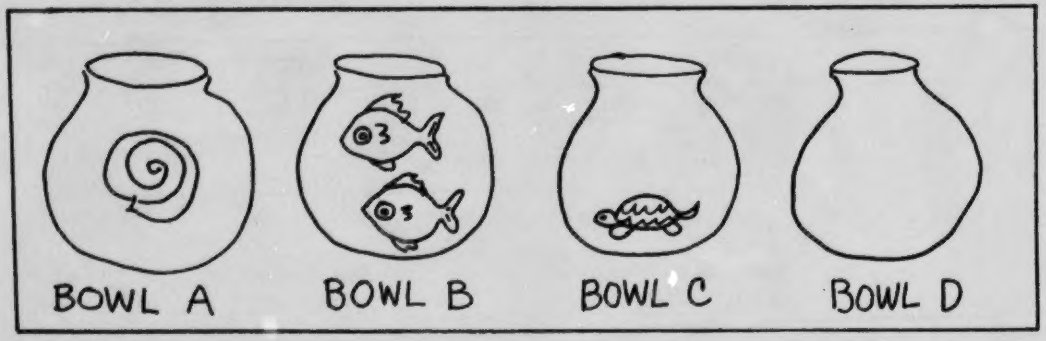
CONTENT: Sets

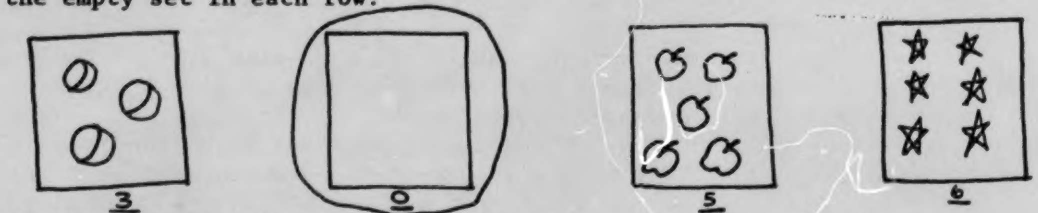
OBJECTIVE: The learner will be able to identify the empty set. K-2 *2

ACTIVITIES

1. Display a large picture similar to the one below. Ask questions such as, "How many frogs do you see in A, B, C, D? How many snails do you see? How many fish to you see?" etc. The answer will always be zero for D. This is an empty set.



2. Give each child a sheet with pictures of sets. Have five rows of sets. Each row contains 4 pictures of sets, one of which is the empty set. The child must identify each set, then draw a circle around the empty set in each row.



(Variation) Use ziplock bags with buttons--have one empty set.

3. Place four dishes on a table or desk. Fill two of them with one to five objects, such as buttons or coins. Leave two of them empty. Ask the children which dishes show the number 0. Also, inquire about the number of objects in the other dishes.

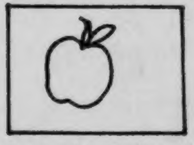
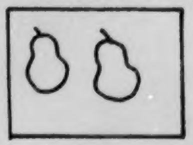
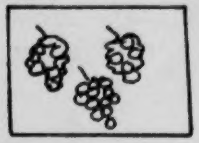
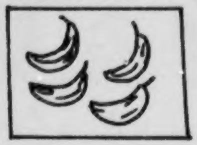
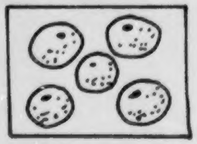
CONTENT: Sets

OBJECTIVE: The student will be able to identify sets that are equal in number. K-2

ACTIVITIES

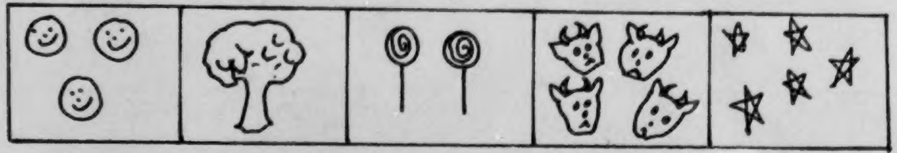
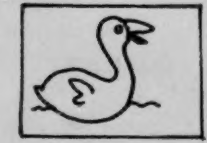
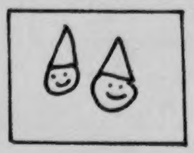
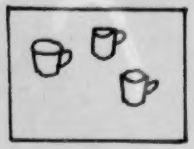
1. Have the children play in groups of two to four. One child shuffles the cards, deals seven to each player, and turns the rest face down in a pile. The players take turns turning up a card from the pile. For each card turned up, each player discards a matching card. Any player who does not have a matching card in hand must draw from the pile until getting one. The first player to run out of cards or the player with the fewest cards at the end of the game wins.

   Materials: Forty-two cards like the ones shown below, each for a number from one to five.

2. Rule a piece of tagboard into five sections and paste a set of one to five pictures in each section. Make matching tagboard cards showing sets of one to five pictures. Have the children match each card to the section that shows as many things and place it over the section.

   Materials: Tagboard, pictures cut from magazines or catalogs.

3. On the tagboard draw a "flower patch" of five large flowers, omitting the petals. Fill the center of each flower with a set of one to five dots. On the petals, draw or paste pictures or geometric shapes in sets of one to five. Have the children match each petal to the appropriate flower to make the garden grow.

   Materials: Tagboard, about 30 large "petals" cut from construction paper.

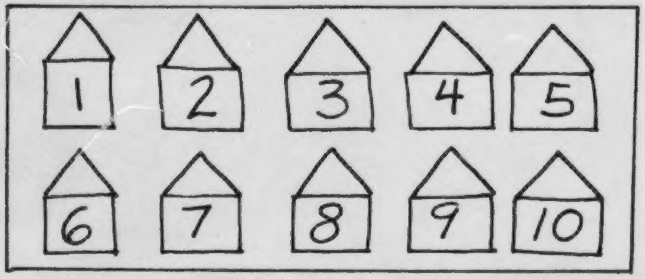
CONTENT: Sets

OBJECTIVE: The student will be able to compare and construct sets (one more, one less; limit 10) 1-2 *2

ACTIVITIES

1. Play the game "matching counters." Count out several sets of counters and place a rubber band around each set. Some sets should have the same number of counters--for example, two sets of 5. Place the bundles in a shoe box on a table. Have two children sit at the table and choose a set of counters each. Each time one child puts a counter on the table, the other child should match it with one of his or her own. If the sets match the children should say "equal." If they do not match the first child to correctly say which set has more or which set has less wins a point. The first child to get five points wins the game. (This game can be adapted to the flannelboard to allow larger groups to play.)

2. Give children a worksheet similar to the one below.



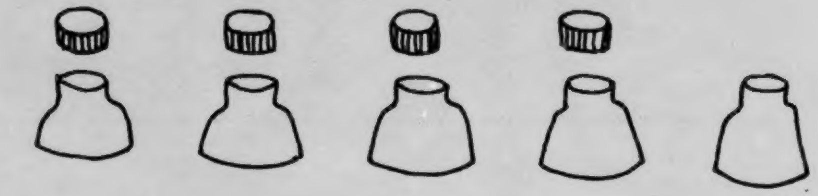
The purpose of this game is to find the missing box. Which box is the missing box? Color it your favorite color.

As you read the following, color your answer with a red crayon.

one more than 2
one less than 6
one more than 5
one less than 10
one less than 2
one less than 8
one more than 9
one more than 1
one more than 7

(Variation) Assign a color to each statement--the one left over is white.

3. Place a row of five small jars and four jar covers on the table. Ask the children to match the covers with the jars. Ask questions such as, "Does each jar have a lid?" "Do we have more jars than lids or more lids than jars?" etc.

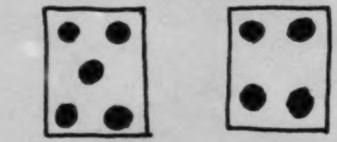


CONTENT: Sets

OBJECTIVE: The student will combine or separate the members of a set of concrete objects (2-6) in real situations. K-1

ACTIVITIES

1. Provide children with three sets of cards, two sets of cards showing a number of dots from 1-9, and a third set showing the addition combinations.

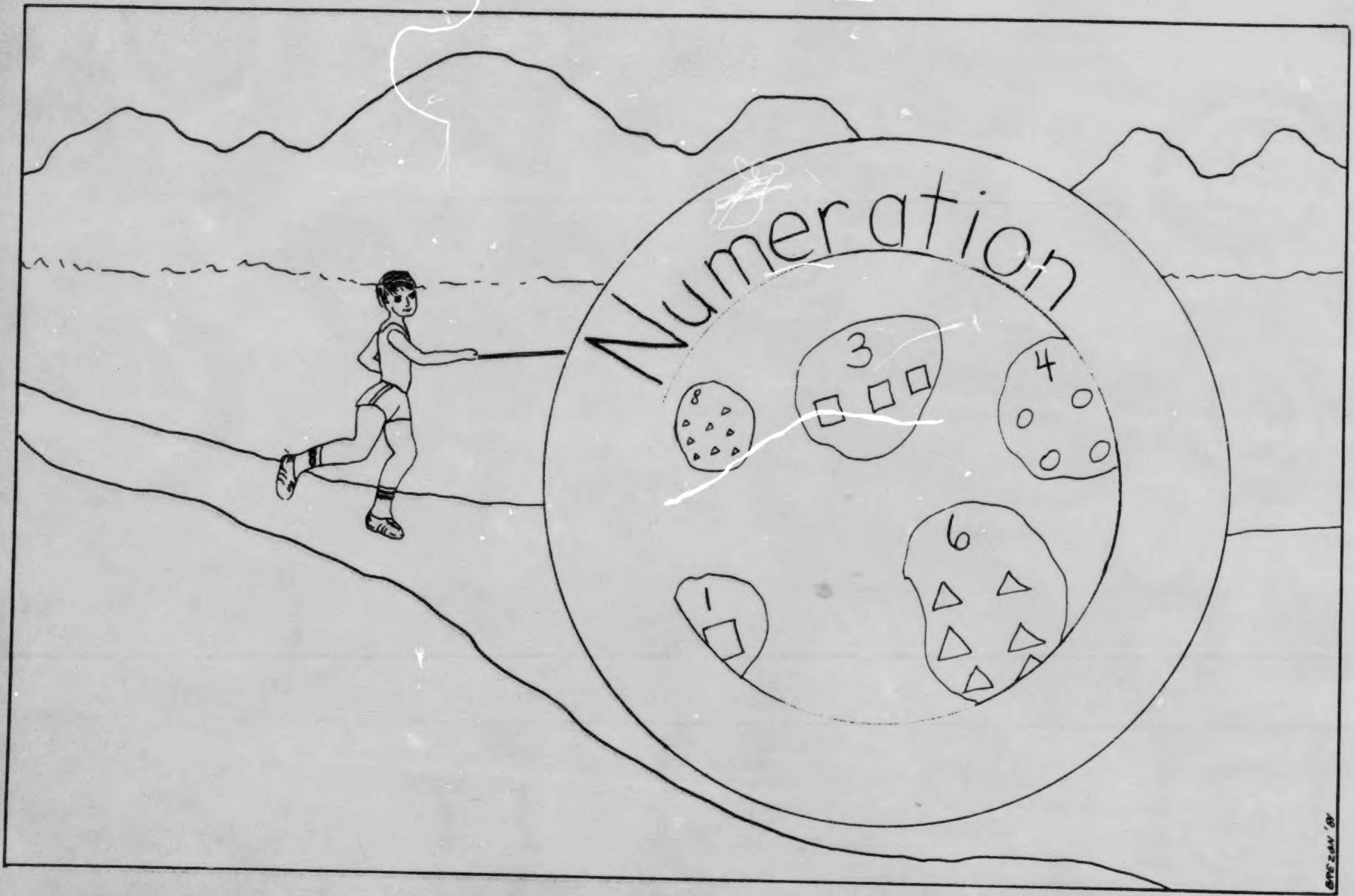


$$\begin{array}{r} 5 \\ +4 \\ \hline 9 \end{array}$$

The student will draw a card from the first two sets and then find the problem and answer for that addition combination. The student may make up "real life" story problems and act them out, having other students guess what they are depicting.

2. The students may construct story problems by pasting pictures cut from magazines on construction paper. After they are completed, the students may exchange pictures and each student may write the exercises which correspond to the story problems pictured. They may discuss the results among themselves, deciding whether the story problems have been represented correctly in each instance.

3. Give each child some counters. Let the children tell stories. Have the children use counters to dramatize the story. Then assist them in writing the appropriate number sentences and finding the sum.


Numeration
8
3
4
1
6
BREZON '81

CONTENT: Numeration

OBJECTIVE: The student will be able to count concrete objects (1-10). K *K

ACTIVITIES

1a. Record the counting sequences on the tape recorder. Example: one, two, three, pause - one, two, three, four, five, pause...continue with sequences up to 10.

b. Provide counters to be used such as buttons, beans, small wooden blocks, etc., and construction paper to place the counters on.

c. The children will count along with the tape recorder, putting a counter onto a square of paper as each number is recited. When the tape is finished, start the tape over and let the students check each other's papers, counting the blocks along with the tape.

Materials: Tape recorder, counting tape, counters, construction paper.

2a. Have the students count aloud as the beans are dropped into the baggie.

b. Have the students pass the baggie around the group until they hear you ring the bell, which is the signal to "spill the beans."

c. Before the beans are spilled, ask the students to predict how many beans are in the bag. Let them whisper their predictions in your ear.

d. Let the students count the beans to check the total.

e. Continue the game in the same manner, varying the number of beans used each time.

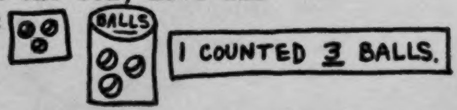
Materials: Beans, bag or baggie, bell

3a. Label the jars or boxes which contain the sets of objects.

b. Make 10 labels stating "I counted ______" and the name of the objects.

c. On index cards write several sets of the numerals 1-10.

d. Have the student put out the boxes and place some objects into each box. Place the appropriate "I counted" label in front of each box. After the student counts the objects in the box, have him place the appropriate card with the numerals on the "I counted" label. Example:



CONTENT: Numeration

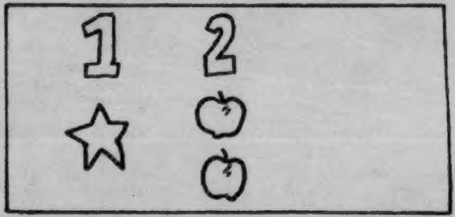
OBJECTIVE: The student will be able to count semi-concrete objects 1-10. K *K

ACTIVITIES

1a. On the back of cut-out flannel numerals place the appropriate number of dots to help with self-checking.

b. Cut out flannel shapes, using different patterns for each set of numerals. Example: 1 star, 2 apples, 3 flags, 4 trees, etc.

c. The student takes the flannelboard pieces to the flannelboard, sorts them into like sets, counts the members in each set and applies the appropriate numeral.



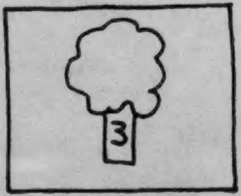
Instead of using one large flannelboard, make individual flannelboards using cigar boxes. Cover the inside lid with flannel and place the flannel shapes of numerals on the inside of the box for storage.

Materials: Flannelboard, flannel shapes of different patterns for sets 1-10, cut-out flannel numerals, container for flannel shapes and numerals

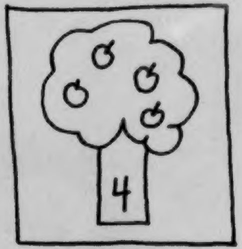
2a. Using red felt, cut approximately 50 small apples.

b. Using green felt, cut 10 tree tops.

c. On the pieces of tagboard or posterboard (6" x 9") color a brown tree trunk and paste the green tree top. Write the numeral on the tree trunk.



d. Let students place apples on each tree until the amount matches the numeral on the tree trunk.



Materials: Posterboard or tagboard, brown marks-a-lot, green and red felt, container for game pieces

3. Take one object and say, "I've got one. Now it's your turn." Have the child take an object and ask, "How many do you have?" Then take a second object, saying, "Now I've got two. You take one more, too. Now how many do you have?" Continue the activity through 20.

Materials: Beans, buttons, stones, nuts, counters, or other objects appropriate for counting.

517

516

CONTENT: Numeration

OBJECTIVE: The student will be able to count to 10 by ones. K *K

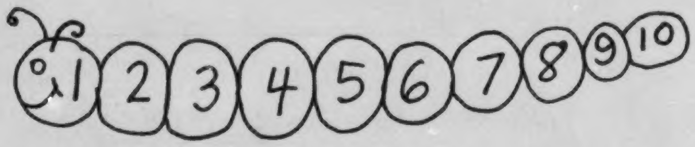
ACTIVITIES

1. While one child has his or her eyes closed, another child counts out a number of objects, writes the corresponding numeral on a piece of paper, and hands the objects to the first child. With eyes still closed, that child counts the objects and then opens his or her eyes to check the count against the written numeral. The children then switch roles to continue.

   Materials: Straws, sticks, or other objects for counting.

2. Have the children assemble the worm in order.

   Materials: Heavy cardboard or plywood worm cut into 10 pieces.



3. Have the children count how many steps they need to take to go from a given point in the room to various other locations, such as the pencil sharpener, the wastebasket, a table, the door, and so on. List the locations (using sketches if you wish) and the number of steps on chart paper. Then play a game by having the children ask to go to these locations by saying, for example, "I want to take eight steps."

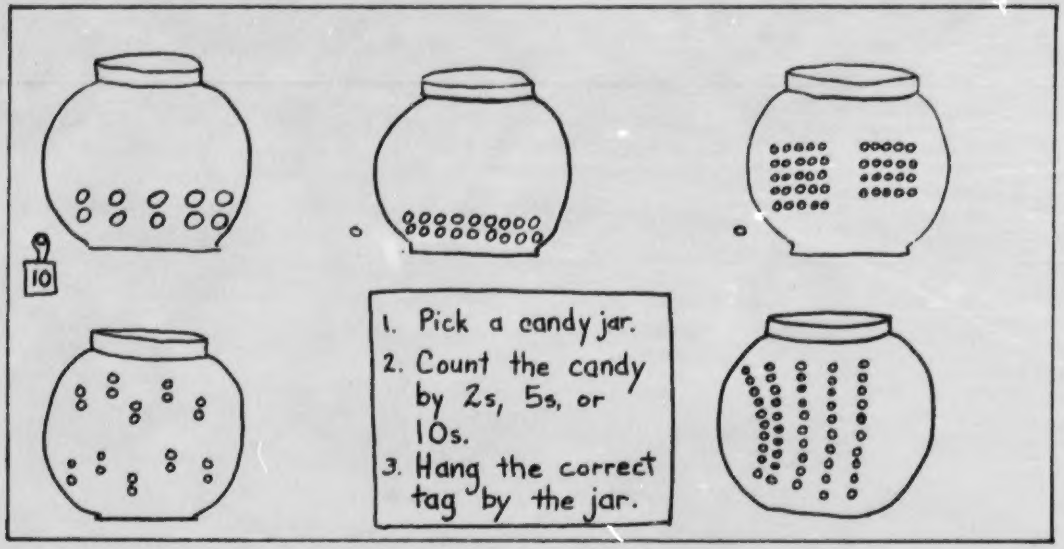
   Materials: Chart paper, felt-tip pens

CONTENT: Numeration

OBJECTIVE: The student will be able to count to one hundred by ones, twos, fives, and tens. 1-2 *2

ACTIVITIES

1. Cut construction paper in the shape of candy jars (5). Cut out 35 pieces of candy. Glue a certain number of candy pieces on each paper "jar." Put a pushpin near each jar on the board to hold the tag. Write numerals on the cards which correspond to the number of candy pieces, pinch a hole in the end of each card, and make a loop of string. Hang the cards by the loops of string from pushpins on the bottom of the board. The student selects a candy jar, counts the number of candy pieces by 2, 5, or 10, and tags the jar with the card for that number. You may wish to use piggy banks and coins or eggs and baskets instead of candy jars and candy. See diagram below.



1. Pick a candy jar.
2. Count the candy by 2s, 5s, or 10s.
3. Hang the correct tag by the jar.

Do what it says on the back of the card. Write to 10 by 2's.

2. Tell the children you are going to start counting by tens and each time you stop you are going to call on someone to name the next number in the sequence.

3. Provide opportunities for children to practice counting by twos. For example, the child may count children, books, etc., by two.

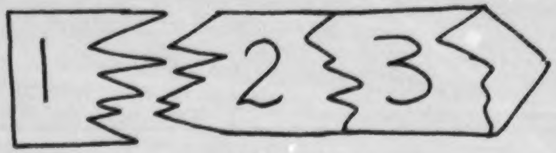
CONTENT: Numeration

OBJECTIVE: The student will recognize numerals in sequential order (1-10). K *K

ACTIVITIES

1. Teach students the song Ten Little Indians. Place large numeral cards (1-10) on the chalkboard. As the class sings the song, have one student point to the appropriate numeral. Allow all students to participate in this activity.

2. On a large sheet of construction paper print the numerals 1-10. Mount the construction paper on heavy cardboard and cut into a puzzle.



Let students put the puzzle together for practice in sequencing 1-10.

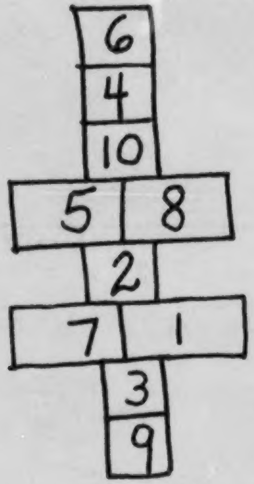
3. Tape the numerals 1-10 on the seat of ten chairs. Let the students put the chairs in order for the reading circle or small group activities.

CONTENT: Numeration

OBJECTIVE: The student will recognize the numerals in random order (1-10). K-1 *K

ACTIVITIES

1. Make a hopscotch on a large piece of plastic (shower curtain, old plastic table cloth, etc.). On the hopscotch write the numerals 1-10 in random order. Ask the students to read each numeral as they hop on it.



2. Make a numeral book with 10 pages for students. Put a numeral at the top of each page in random order. Have the students illustrate the numerals (example, 10 apples).

3. On a checkerboard tape in random order write the numerals 1-10. The students must correctly call out the numerals their checker is on before they move and the one they land on. Follow the rules for regular checker game.

CONTENT: Numeration

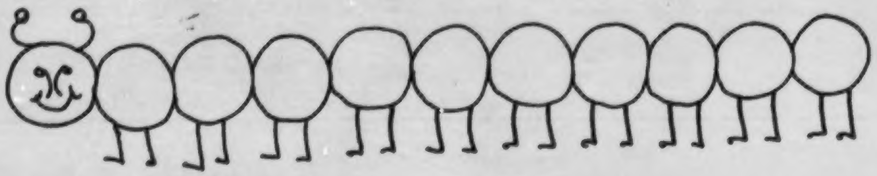
OBJECTIVE: The student will write the numerals in sequential order (1-10). K-1 *1

ACTIVITIES

---

1. Make a set of numeral cards 1-10 and place them in a box. Have a child come to the front, select a numeral card, and read it aloud to the class without showing it to the other children. Have the rest of the class write a numeral for that number on a sheet of paper and then compare this numeral with the one on the card when it is shown to the class. Now have the students write the numerals in sequential order on the same paper.

2. Make a ditto sheet of a caterpillar similar to the example:



Have students write the numerals 1-10 in sequential order on the caterpillar.

(Variation) Permit students to cut out 11 circles using construction paper. Write the numerals 1-10 on the circles. Draw the face. Cut out the antenna and legs and attach them by gluing the body in order on tagboard.

3. Provide a box of salt, sand, or grits for students who have difficulty in writing. Let students practice tracing the numerals in sequential order in the sand.

CONTENT: Numeration

OBJECTIVE: The student will be able to recognize numbers in sequential order (1-100). 1-2

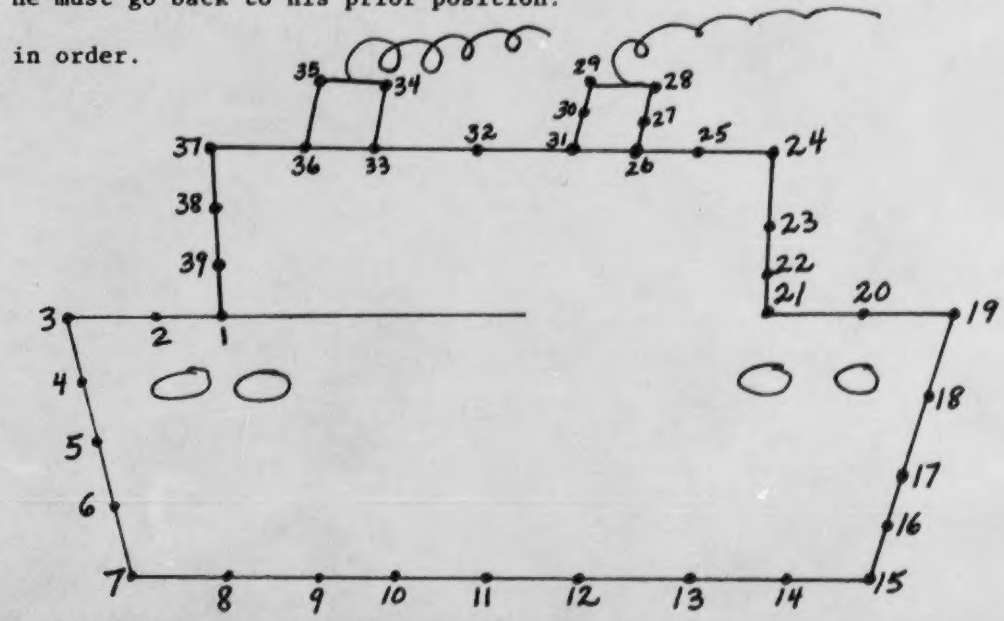
ACTIVITIES

1. Divide the class into two teams. The teacher holds up a numeral card (1-100). The first child on Team A tries to tell what number follows. If he answers incorrectly he must sit down. The team with someone still standing wins the game. Or after playing 10 minutes - the team with the most players still standing wins the game.

2. Let the children use a numeral chart with numerals from 1-100. Make 30 cards with the following information on them.
   (1) move 5 spaces (can be any number)
   (2) move back 1 space
   (3) lose 1 turn
   (4) take another turn

   All players start with their tokens on the numeral one. Taking turns, each player draws a card from the pile. He moves his token the number of spaces indicated on the card. In order to stay on that number the child must correctly tell what number he is on. If he cannot correctly say the number he has landed on he must go back to his prior position.

3. Join the dots in order.



CONTENT: Numeration

OBJECTIVE: The student will be able to recognize numerals in random order (1-100). 1-2

ACTIVITIES

1. Have the children write or tell the missing numerals.

51			54		56

40		42			45

2. Have the children write the following numeral cards, one numeral to a card.

40	52	30	25	76
62	42	81	37	99
49	66	15	51	10

Tell the children to arrange the cards in order on a table or on the floor

3. Draw the following chart on the chalkboard.

41			44			47
48			51	52		
55		57				61
62		64		66		

Have the children supply the missing numbers.

CONTENT: Numeration

OBJECTIVE: The student will supply the missing numerals in a sequence (1-10). K-1 *1

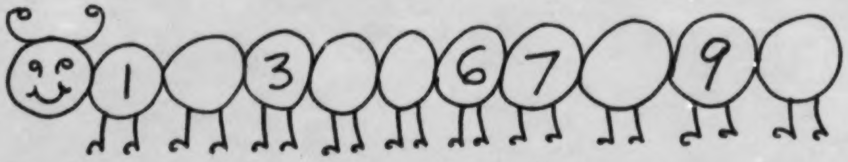
ACTIVITIES

---

1. Provide each student with a sheet of construction paper divided into 10 squares with the numerals 1-10 written on them. Have students cut out the squares and put them in an envelope. Select two numbers such as 6 and 8 and write their numerals on the chalkboard. Have the children locate the one containing the numeral which comes between 6 and 8. Ask children to select other pairs of numbers for the class to consider.

2. Duplicate a calendar with the name of the month, the days of the week, and the first and last day of the month. Ask the students to fill in the missing numerals in the appropriate spaces.

3. Duplicate a caterpillar similar to the example below.



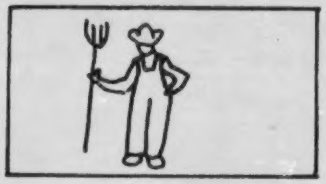
Have students supply the missing numerals.

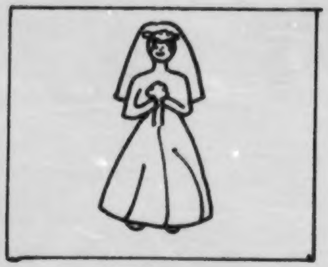
CONTENT: Numeration

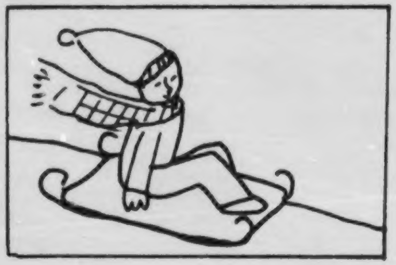
OBJECTIVE: The student will be able to repeat a pattern from a given sequence. K-1 *1

ACTIVITIES

1. Have the class draw pictures of people sitting and standing. Spread the children's pictures face down on the floor. Ask one child to turn over three pictures. Get the pattern going: stand, sit, stand, stand, sit, stand....Let half of the class be the audience and the other half of the class participants. Form a long line of chairs. Have the audience chant, "Stand, sit, stand...." Each child in the line should stand or sit to match the pattern.



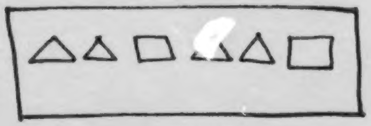




2. Give the children pattern blocks and construction paper cut into the pattern block shapes. Ask a small group of children each to take five or six pattern blocks and stand them up. When each child has found a pleasing design, he is ready to copy it onto construction paper, gluing down the appropriate shapes.

Example:

△△ □ △△ □



536

537

3. Make different patterns with junk, pattern blocks, chairs, children, etc.

Example:

boy, girl
red, blue
stand, sit, etc.

538

CONTENT: Numeration

OBJECTIVE: The student will be able to write missing numbers in a sequence through 100. 1-3 *3
The student will supply the missing numbers in a sequence through thousands. 2-4 *4

ACTIVITIES

1. Give each child a copy of the chart below. Have them fill in the missing numbers.

1	2				6				10

2. Give the children a set of cards for numbers 1-100. Each student is to shuffle the cards and arrange them in order, using a number chart as a guide. After the child has put the cards in order from 1-100, he may write the numerals in order.

3. Display a number chart with several numerals missing. Point to these blank spots and ask the children to write what number goes in that spot. Then have the children write the numeral that comes before and after.

CONTENT: Numeration

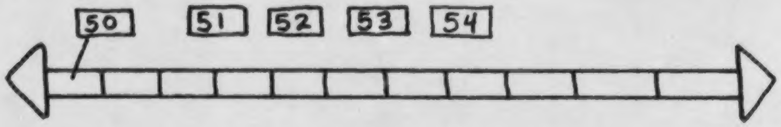
OBJECTIVE: The student will be able to write the number that comes before (after) a given number (1-99). 1-3 *3

ACTIVITIES

---

1. Provide each group a set of 11 index cards. On each card one of the numerals from 10 to 20 is printed. Have a student in the group draw one of the cards at random. The other students are to use a number line to name the number which "comes before" it and the number which "follows" it. Have other students draw other cards and continue the activity for practice.

2. Give the children long strips of paper, paste, crayons and small paper squares. Ask the children to write their numerals from 50 to 60, one numeral per paper square. Ask the children to paste the numerals in order on the number line. See diagram.



After the children have made their number line, give them several problems to work using it. For example:

(1) 54 comes before ________
(2) 59 comes after ________
(3) 51 comes before ________
(4) 52 comes after ________
(5) 58 comes before ________

3. Write a numeral from 10 to 20 on the chalkboard and have the students use a number line to find which numeral comes before and which comes after it.

541

542

CONTENT: Numeration

OBJECTIVE: The student will be able to write the numeral that comes before and after a given number (1-1000). 2-4

ACTIVITIES

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1. Have the students draw sets using crayons or markers as you give a set description such as:

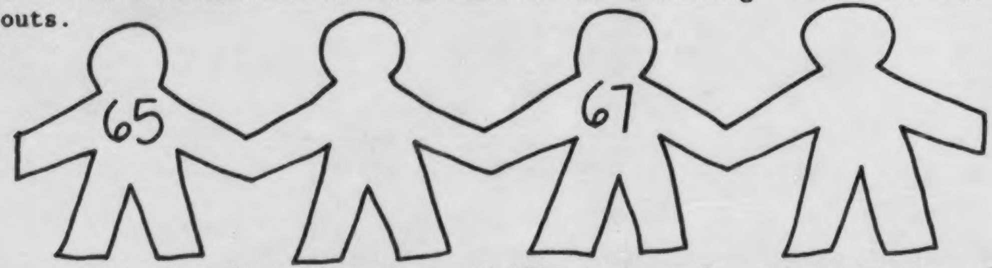
   a. A set of 7 has one more object than this set.

   b. A set of 9 has one less object than this set.

   c. This set has more than 7 objects but less than 9 objects.

   d. This set has more than 15 objects but less than 17.

2. Help students prepare 10 to 20 connected cut-outs such as the following. Each set should have 10 or more connected cut-outs.



   Let students select a series of numbers between 1 and 1000 to record on the cut-outs. Have them omit every other number as shown in the example. Students may exchange cut-outs and fill in the missing numerals.

3. Give students place value boards with squares for the ones, tens, hundreds, and thousands place. Have students place numeral cards in the appropriate squares as you call out directions like the following:

   a. Show the numeral that is one less than 200.

   b. Show the numeral that is one more than 599.

   c. Show the numeral that is more than 855 and less than 857.

CONTENT: Numeration

OBJECTIVE: The student will be able to recognize and write even and odd numerals in sequence (1-100).

2-3

ACTIVITIES

1. Divide the students into small groups and give each group a set of number cards from 1-100. Have the students sort the cards into two groups of even and odd numbers. Then arrange the odd and even numbers in sequential order.

2. Divide into small groups. Have the students write a paragraph about someone who encounters only odd numbers in their experiences. (Example: address, phone number, social security number, etc.). Rewrite the story using even numerals.

3. Give students six beans and have them pair the beans in twos. Point out that since none is left over, six is an even number. Do the same with an odd number. Let the students experiment with numbers and record whether they are odd or even.

CONTENT: Numeration

OBJECTIVE: The student will be able to supply the missing numbers in a sequence of odd or even numbers (1-100). 1-3 *3

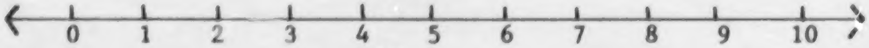
ACTIVITIES

1. Place the even numbers in a pocket chart, leaving out every other one. Have the children place the correct number in the correct spot in the pocket chart.

2. Give the children a set of cards which shows the numbers from 1 to 100 and two boxes, one labeled "Odd Numbers" and the other labeled "Even Numbers." Have the children place the cards in the correct boxes.

3. Give each child a number line. Have the children circle all of the even numbers. Have the children write the even numbers in correct order.

   Example:



CONTENT: Numeration

OBJECTIVE: The student will be able to supply the missing numbers in a sequence of odd and even numbers (0-1000). 3-4 *4

ACTIVITIES

1. Display the following on the chalkboard.

$$\begin{array}{r}0\\ \underline{\times\ 2}\end{array}\qquad \begin{array}{r}1\\ \underline{\times\ 2}\end{array}\qquad \begin{array}{r}2\\ \underline{\times\ 2}\end{array}\qquad \begin{array}{r}3\\ \underline{\times\ 2}\end{array}\qquad \begin{array}{r}4\\ \underline{\times\ 2}\end{array}\ \ldots\ldots\ldots\ \begin{array}{r}12\\ \underline{\times\ 2}\end{array}$$

Draw a number line on the chalkboard showing whole numbers from 0-25. Have the students give each product and circle the answer on the number line. Explain that all of the numbers circled are called even numbers and the rest are called odd numbers. Point out that even numbers have 2 as a factor and odd numbers do not.

2. Have students find the pattern in similar exercises and complete the pattern.

a. 101, 103, 105, 107, _____, _____, _____, _____

b. 202, 204, 206, 208, _____, _____, _____, _____

3. Have students complete exercises similar to the following:

Name the next five even numbers: 40, 42, 44, ____, ____, ____, ____, ____
Name the next five odd numbers: 25, 27, 29, ____, ____, ____, ____, ____

CONTENT: Numeration

OBJECTIVE: The student will be able to supply the missing numbers in a sequence of numbers that are multiples of five or ten (limit 100). 3-4 *4

ACTIVITIES

1. Ask the students to orally complete this sequence:

   10, 20, 30, ____, ____, ____, 70, ____, ____, 100, ____, ____, ____, ____, ____, 160. Explain that numbers in this sequence are called multiples of 10. Then ask them to name some multiples of 10 that are greater than 200.

2. Have the students complete exercises similar to the following to find multiples of ten.

   3 x 10 = ____ and 10 x 3 = ____ 4 x 10 = ____ and 10 x 4 = ____

   6 x 10 = ____ and 10 x 6 = ____ 8 x 10 = ____ and 10 x 8 = ____

3. Give the students a chart similar to the following:

5	10	15	20	25
30	35	40	45	50
55	60	65	70	75
80	85	90	95	100

Have the students use the chart to supply the missing numbers.

a. 10, ____, ____, 40, ____ b. ____, ____, 50, ____, 70

c. ____, 70, ____, ____, 100 d. 5, ____, ____, 20, 25

e. 15, ____, 25, ____, 35 f. ____, 70, ____, ____, 85

CONTENT: Numeration

OBJECTIVE:
(1) The student will supply the missing numbers in a sequence of numbers through 10,000. 3-4 *4
(2) The student will be apply to supply the missing numbers in a sequence through 100,000. 4-5 *5
(3) The student will supply the missing numbers in a sequence through millions. 5-6 *6

ACTIVITIES

1. Prepare construction paper sequence strips, a different color for each sequence.

   Example:

   Yellow 5781 5782 5783 5784 5785 5786 5787 5788
   5789 5790 5791

   Red 97,432 97,433 97,434 97,435 97,436 97,437

   Students sort the colors and put the numbers in order.

   (Variation) Use additional colors and make sequences with differences in tens, hundreds, or thousands place. Example: 61,035; 61,045; 61,055, etc., or 89,237; 89,337; 89,437; etc.

2. Divide the group into two teams. Two members of each team go to the board. A number between 0 and 100,000 is called out. The students write the numeral before and after. The first one to get both correct scores a point for his/her team.

3. Give the child a small chalkboard.

   The teacher writes a numeral for the students to copy. The student then changes the numeral to show which number comes next. The teacher helps the student to realize that counting is just adding one.

CONTENT: Numeration

OBJECTIVE: The student will be able to supply the missing numbers in a sequence which requires addition, subtraction, multiplication, or division. 7-10 *10

ACTIVITIES

1. Have students complete function problems for each of the operations.

☐	☐ + 3
1	(4)
5	(8)
6	(9)
8	(11)

☐	☐ - 4
6	(2)
9	(5)
46	(42)
57	(53)

☐	☐ x 7
2	(14)
6	(42)
11	(77)
14	(98)

☐	☐ ÷ 6
24	(4)
54	(9)
72	(12)
30	(5)

2. Distribute blank charts like the ones above. Have the students make up their own function problems using addition, subtraction, multiplication, and division. Exchange with another pupil to check.

555

556

CONTENT: Numeration

OBJECTIVE: The student will be able to determine the pattern for a given number sequence and continue the sequence. 5-7

ACTIVITIES

1. Give the students series of numerals using a particular pattern in each one. Have the students continue the pattern with an additional three numerals.

   a. 2, 6, 10, 14, 18, 22, 26, 30

   b. 1; 11; 111; 1,111; 11,111 111,111 1,111,111 11,111,111

   c. 14, 39, 64, 89, 114 139, 164, 189

   d. 264, 277, 290, 303, 316 329, 342, 355

2. Give the students series of numerals where there is a numeral(s) that does not fit the pattern. Instruct the students to find the number(s).

   a. 12, 14, 16, 18, 19, 22, 24, 26

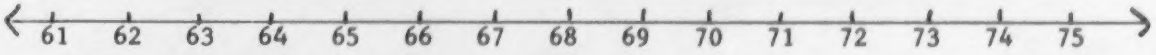
   b. 1, 2, 2, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 5, 6, 6, 6, 6, 6, 6

   c. 10, 9, 20, 19, 30, 29, 40, 38, 50, 49

   d. 1, 2, 3, 2, 11, 12, 13, 13, 21, 22, 23, 22, 31, 32, 33, 32

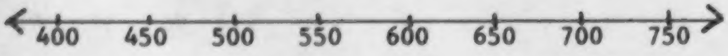
3. Give the students a marked number line such as the following. For each number line, give a list of numerals. Using the number line, have the students arrange the numerals in order, from the least to the greatest.

   a.



69 61 74 70 75 66 64

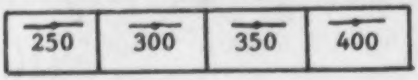
61 64 66 69 70 74 75


400
450
500
550
600
650
700
750

410 570 740 470 630 710 660 550

410 470 550 570 630 660 710 740

b. This activity can be made into an independent learning center activity by writing numerals on cards to be placed side by side.

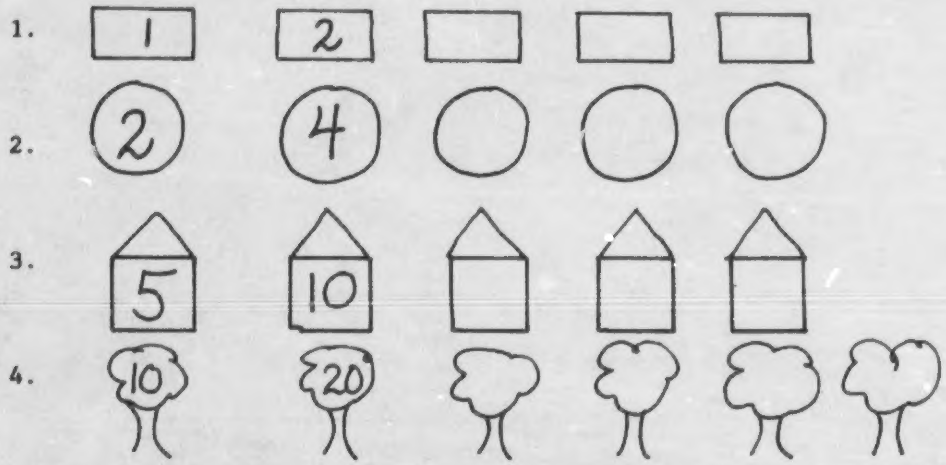

250
300
350
400

CONTENT: Numeration

OBJECTIVE: The student will be able to write to 100 by ones, fives and tens. 1-2 *2
The student will write to 100 by tens. 1-3 *3

ACTIVITIES

1. Give the children an activity table sheet similar to the one below. Have them complete the table and then turn it on the back to see if they completed the activity correctly. Finish what Jumbo has started.



2. What is the secret message?

A B C D ...
5 10 15 20 etc.

C O M E
15 75 65 25   100 75   65 125

20 25 95 55   30 75 90   5

15 75 75 55 45 25

561

Have the children complete the number pattern for each letter of the alphabet. (Example: A-5, B-10...). As the children find the secret message, actually have them come to your desk for a cookie.

3. Have six children stand in a row and each hold up one hand. Ask the children to suggest ways for finding out how many fingers there are altogether. Count the fingers one by one on the first child's hand and write 5 on the chalkboard. Begin with 6 and continue counting the fingers on the hand of the next child. Continue counting the fingers on the hands of the other children. Write every fifth numeral on the chalkboard, and have different children read them. Explain that this is how to count by fives.

CONTENT: Numeration

OBJECTIVE: The student will identify position of location: over-under; left-right; nearer-farther, etc. K-2 *2

ACTIVITIES

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1. Play the game "Let's Be Soldiers." Have the class stand in single file facing the front of the room. Give different commands using the vocabulary above and have the children follow the direction. Example: Face the back of the room; sit down; move near the front door; and turn to the right.

2. In circle formation have the children face the center and perform the actions as they sing:

   I put my right hand in,
   I put my right hand out,
   I put my right hand in and shake it all about.

   Repeat for left hand, right foot, left foot, right side, left side, whole self.

3. Using felt cut-outs on the flannelboard, give directions to the children using the above vocabulary:

   Examples: top-bottom-middle

   Use a piece of yarn to divide the flannelboard horizontally into two parts. Ask a child to point to the top of the flannelboard. Have another child point to the bottom. Distribute a variety of felt cut-outs and have children take turns placing them on the top or bottom of the flannelboard according to your directions.

   Name one of the cut-outs and have a child tell whether it is located at the top or bottom of the flannelboard.

   Next, use two pieces of yarn to divide the flannelboard horizontally into three parts. Modify the activity described above to include the middle position as well as the top and bottom.

   *Using the flannelboard and cut-outs, adapt the other vocabulary words.

   Materials: Flannelboard, felt cut-outs

565

564

CONTENT: Numeration

OBJECTIVE: The student will be able to recognize zero as the cardinal number of the empty set. 1-3 *3

ACTIVITIES

1. Have the children complete the numeral card for 0. Stress the fact that no picture will be drawn if zero objects are to be shown.

2. Provide the students with several paper cups and index cards with tally marks. In each cup are either one, two, three or no objects. The student is to match up the number of objects in the cups with the tally marks on the index cards. (A blank card will match the empty cup.)

3. Hold up a large object, for example, a toy or book. Ask how many, and have a child write the number 1 on the chalkboard. Remove the object, and hold up your empty hands. Ask how many, writing the number 0 on the chalkboard.

CONTENT: Numeration

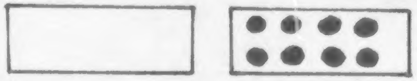
OBJECTIVE: The student will be able to use zero as the identity element in addition. 1-3 *3

ACTIVITIES

---

1. Prepare cards showing sets of objects. Include a zero card representing the empty set to help children understand the identity element for addition. Give each child several of these cards including one showing the empty set. Ask them to combine the cards in different ways and write equations for each combination they were able to make.

   For example:



0 + 8 = 8

2. Have students demonstrate on number lines such simple addition and subtraction sentences involving zero as the following:

   a. 5 + 0 = ☐ ; b. 0 + 8 = ☐ ; c. 4 + 0 = ☐

   Use numbers which are appropriate to the range you wish your pupils to master.

3. Place a large number line on the floor and provide each child with his individual number line. Allow the children to dramatize the combining of sets. For example, have them combine a set of five with an empty set. They will see that when adding zero to a number, they will take no additional jumps and, therefore, the number representing the combination of the two sets is the same as the number with which they began.

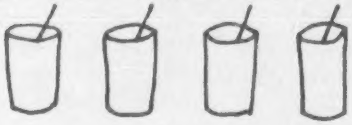
CONTENT: Numeration

OBJECTIVE: The student will be able to use one as the identity element in multiplication. 3-4 *4

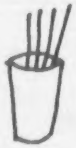
ACTIVITIES

1. Use paper cups and straws to show multiplication.

Put 4 cups on a table. Put 1 straw in each cup to demonstrate that 4 ones is 4. Then put 4 straws in 1 cup to show that one 4 is 4.



4 x 1 = 4



1 x 4 = 4

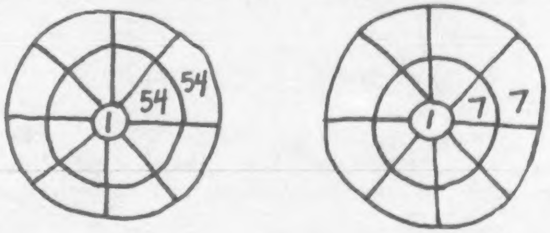
Repeat this procedure with different numbers of cups and straws to show:

5 x 1 = 5
1 x 5 = 5
6 x 1 = 6
1 x 6 = 6
7 x 1 = 7
1 x 7 = 7

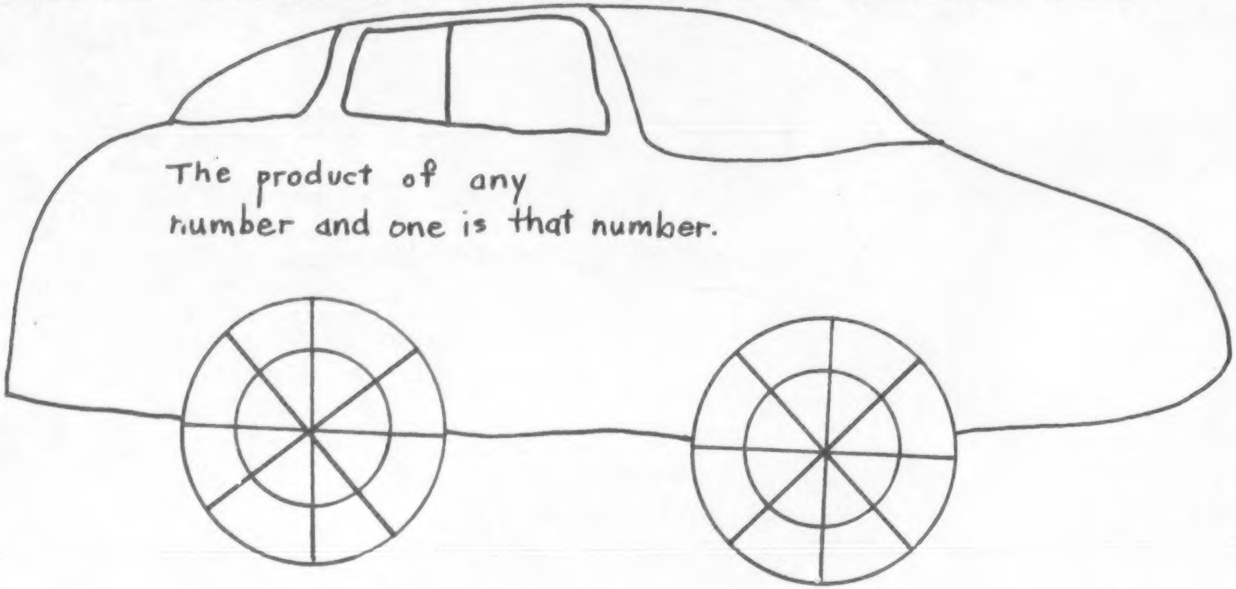
8 x 1 = 8
1 x 8 = 8
9 x 1 = 9
1 x 9 = 9
10 x 1 = 10
1 x 10 = 10

Ask students to look at the multiplication facts to discover what they have in common. Elicit the idea that the product of any number and one is that number. (Make a permanent aid on transparency or laminated cards of examples as shown above.)

2. Give the students two number wheels like these:



Have the students put a one in the center circle. Next, put any numeral that they would like to multiply by one. Last, put the products in the outer circle. Let them use the wheels to make any vehicle they would like. Write the rule to remember when multiplying by one on the vehicle.


The product of any number and one is that number.

3. Give pairs of students two numeral cubes. Cubes may be made by combining two half-pint milk cartons and covering them with construction paper. Write the numerals 1-6 on the faces of one cube and 4-9 on the other. Taking turns, students roll the cubes, and demonstrate the product with small blocks.

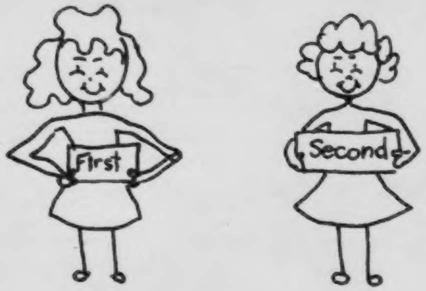
CONTENT: Numeration

OBJECTIVE:
(1) The student will identify and use ordinal numbers through fifth. K-1 *1
(2) The student will be able to identify ordinal numbers through tenth. 1 *1
(3) The student will be able to use ordinal numbers through tenth. 1-2 *2

ACTIVITIES

1. Have five students stand in a row by your desk. Ask the class which student is first in line, second, etc. As you ask the questions, give that child a large card with first written on it. Have him hold the card in front of him so that all of the children will be able to associate that first position with the word first.

   For example:



2. On a sheet of drawing paper have each student draw a picture of a place where people are likely to wait in line, such as a movie theater. Have each student cut out of a magazine five pictures of persons or animals which can be posted in a line by his drawing. Next, have the students label the positions of each picture in the line by cutting out and pasting below each picture the correct word from a ditto sheet.

   (Variation) Play musical chair type game with enough chairs for everyone to sit. Tape ordinal numbers to chairs. When music stops, ask who is first, second, etc.

3. Let children draw and color pictures of animals to be displayed in a parade line on the bulletin board. Have the children place a card below each animal indicating what position he holds in the parade line.

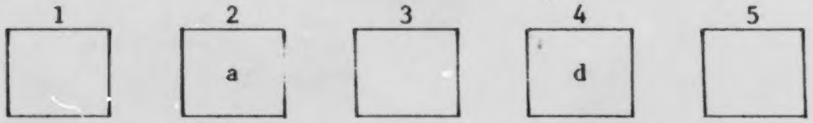
   (Variation) Can use flannelboard.

CONTENT: Numeration

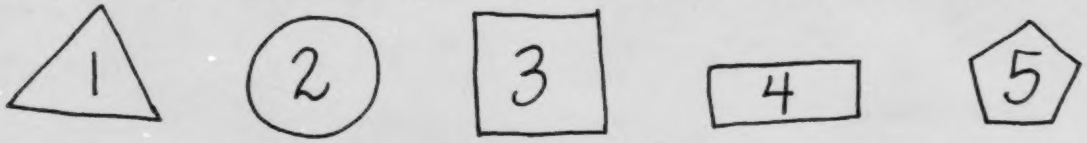
OBJECTIVE: The student will be able to recognize ordinal numbers corresponding to cardinal numbers (1-10). K-1

ACTIVITIES

1. Put five boxes on the chalkboard for a five letter word. For example: candy. Tell a child to write the letter "a" in the second box. Have another child write "d" in the fourth box. After you have given another letter, ask if anyone has an idea of what the word might be. Finish giving the letters and have a child read the word.



2. Display shapes of five different colors. Put the numerals 1, 2, 3, 4, or 5 on the shapes.



Ask the children to put the shapes in order from 1 to 5. Ask questions such as, "What color is the first shape? The fourth shape is ________?" etc.
(color)

3. Give five children cards with the numerals 1, 2, 3, 4, or 5 written on them. Have the five children stand in order as if ready to leave the room. Ask questions such as, "Who is second in line?" etc. Continue to identify each position and introduce the words first, second, third, fourth, fifth.

576

577

CONTENT: Numeration

OBJECTIVE: (1) The student will use ordinal numbers through nineteenth. 2-3 *3
(2) The student will be able to use ordinal numbers though ninety-ninth. 3-4 *4

ACTIVITIES

1. Using tagboard or poster board cut 99 cards. Write ordinal numbers on cards for first through ninety-ninth. Give each child in the class a card. Have the students count off to show the relationship of the ordinal number to the number the student represents. The teacher will call out a number, the student with the corresponding ordinal number will stand and show the card. One set of cards can be used, interchanging them among the students until they have mastered one set.

2. With the aid of reference material, have students write answers to mathematical problems in both cardinal and ordinal numbers.

   Example:
   $$\begin{array}{r} 44 \\ +53 \\ \hline 97 \end{array} = \text{ninety-seventh}$$

3. Given pictures of children in line, animals in a circus or desks in rows, have children label selected items according to the ordinal position.

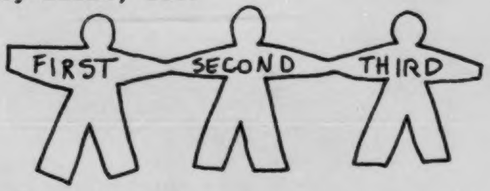
4. Months of the year are good to use for ordinal numbers. Use a pizza wheel and clothespins to match months with ordinal numbers.

CONTENT: Numeration

OBJECTIVE: The student will be able to write the ordinal number word for cardinal numbers through 100. 3-4

ACTIVITIES

1. Cut 10 chains of 10 paperdolls each. Let groups of students label them from first to one hundredth. Display them on a long wall. Discuss the patterns observed: th on the end of tenth, twentieth, thirtieth, etc.; y changed to i on these words; repetition of first, second, third, etc., on twenty-first, thirty-first, etc.



2. Form a committee to poll classmates on the date of their birth. Record the years using ordinal numbers. Using a calendar have them also record the day of the year.

3. Fill a shoebox lid with grits or salt. Have students write with their finger the ordinal numbers in the following sets:

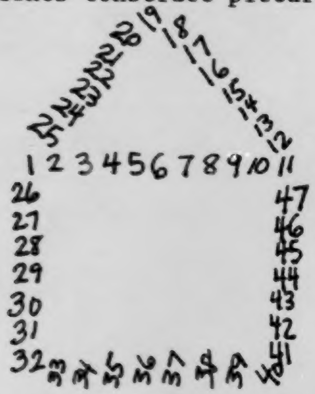
   (a) first through tenth
   (b) tenth, twentieth, thirtieth........hundredth
   (c) twenty-first, twenty-second, twenty-third........twenty-ninth
   (d) twenty-first, thirty-first, forty-first........ninety-first

   Help the students see the relationships of the various counting patterns: adding ones, adding tens, etc.

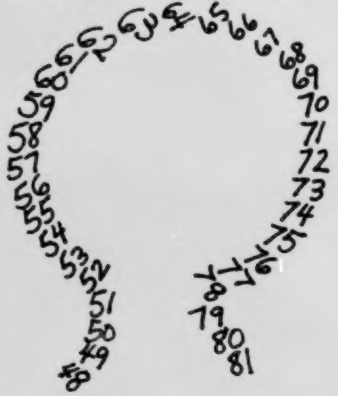
CONTENT:	Numeration		
OBJECTIVE:	(1) The student will read and write numbers through 1,000.	2-3	*3
	(2) The student will read and write numbers through 10,000.	3-4	*4
	(3) The student will read and write numbers through 100,000.	4-5	*5

ACTIVITIES

1. Have students construct pictures using the numerals 1 through 1000.



1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19
20 21 22 23 24 25
26 27 28 29 30 31 32
33 34 35 36 37 38 39 40
41 42 43 44 45 46 47



48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64
65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81

Display pictures on the bulletin board.

2. Hide an object (ex., chalk) somewhere in the room. Select four or five students to tell where the object is located. Call on these students to start counting out loud to 1000. Call on several other students to start searching for the object in the room. As the searching students approach the object the counting students will count louder and as they move away the students will count softer. If the object is located, call on different students and hide it again. The group that counts all the way to 1000 wins.

3. Tape off four squares on the floor to represent the ones, tens, hundreds, and thousands place. Have four students stand in the four squares and give each student numeral cards from zero to nine. As you call out numbers from 1 to 1000, have the students hold up the correct numeral for each place. As a group, read the complete numeral.

CONTENT: Numeration

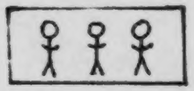
OBJECTIVE: The student will be able to read and write numbers through one million and recognize place value, millions. 5-6 *6

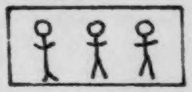
ACTIVITIES

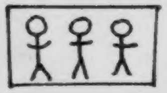
1 a. To assist students in visualizing a million, have 10 students stand at the front of the class. Tell them that there are 100,000 hairs on the head of an average person. Have them count aloud by 100 thousands to see how many hairs the 10 people have. Record results as illustrated.

persons	1	2	10
hairs	100,000	200,000	1,000,000

b. Then group the children into 3 threes, representing hundreds, thousands and millions. Outlines may be taped on the floor for students to stand in.


millions


thousands


ones

c. Call out numbers which name millions. Students show on their fingers the appropriate digit. The tenth child looks at the representation, records the numeral on the board, and calls on someone to read it.

2. Provide the children with resource books. Have them find and record the populations of some large metropolitan areas: Chicago, New Orleans, New York, Los Angeles, Paris, London, etc. Record the population, and rank the cities according to size. Have them write for each city how many people there would be if they added one million more, one hundred thousand more, ten thousand more, one hundred more, ten more, or one more.

3. Using small graph papers, let the students represent one million. Hundreds may be outlined in red, thousands in green, and hundred thousands in blue. Count how many of each are in a million.

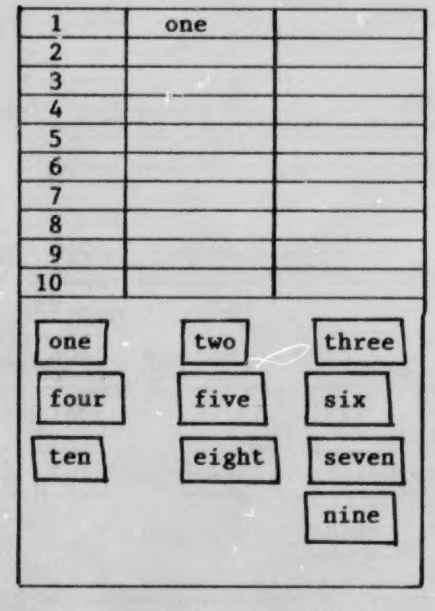
CONTENT: Numeration

OBJECTIVE:
(1) The student will be able to identify number words (0-10). 1 *1
(2) The student will be able to identify number words (11-19). 2-3 *3

ACTIVITIES

1. Give the children two sets of numeral cards. On one set write the numerals 1-10, and on the other set write the word name for each number. Have the children match the cards. Cut-outs can be appealing shapes.

2. Give the children a worksheet similar to the one below. Have the children cut out the number name and place it by the correct numeral.



1	one	
2		
3		
4		
5		
6		
7		
8		
9		
10		

one two three
four five six
ten eight seven
nine

The third column could be used to draw or cut and paste the correct number of objects or for the matching ordinal numbers.

3. Use the flannelboard and flannelboard cut-outs for the letters and numbers. Give each child a numeral. Spell each number name from 1 to 10 on the flannelboard. Have the child place the numeral he has by the correct number word.

CONTENT: Numeration

OBJECTIVE: The student will be able to identify number words for multiples of 10 (20 to 90). 2-3 *3

ACTIVITIES

1. Prepare several sets of number word cards for multiples of 10 (20 to 90) and several sets of matching numeral flash cards. Distribute numeral flash cards to students. As the teacher or a student flashes the number word card, the other students must hold up the matching numeral flash card. Reverse the cards for teacher and students.

2. Make a set of cards with number words for multiples of 10 (20 to 90) and a set of cards with numerals of 10 (20 to 90). Play Concentration, matching numerals to the words.

3. Tape number words for multiples of 10 (20 to 90) on a checkerboard. When students play checkers they must be able to read the names of the numbers for the spaces they cross and the spaces they land on.

589

588

CONTENT: Numeration

OBJECTIVE: The student will be able to:

(1) Read and write number words through one thousand. 4-6 *6
(2) Read and write number words through ten thousands. 4-8
(3) Read and write number words through hundred thousands. 5-8
(4) Read and write number words through millions. 6-8
(5) Read and write number words through billions. 5-8

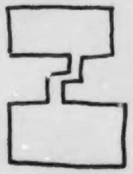
ACTIVITIES

---

1. Play Concentration using number words and numerals on 3" x 5" index cards. Place index cards with words and numerals face down. A student turns up two at a time, trying to make a match. The winner is the person or team with the most matches.

2. Give the students 3" x 5" cards with selected number words through 10,000. Students may put them in chronological order or group them into categories greater than or less than a given number.

3. Have the students make word ladders of the words needed in reading to 10,000. Give them lists to copy from. Put the word on the front of the card and the numeral on the back.



Words lists for Word Ladders:

Ladder 1 (ones)	Ladder 2 (tens)	Ladder 3 (thousands)
zero	ten	one thousand
one	twenty	two thousand
two	thirty	three thousand
three	forty	four thousand
four	fifty	five thousand
five	sixty	six thousand
six	seventy	seven thousand
seven	eighty	eight thousand
eight	ninety	nine thousand
nine		ten thousand

CONTENT: Numeration

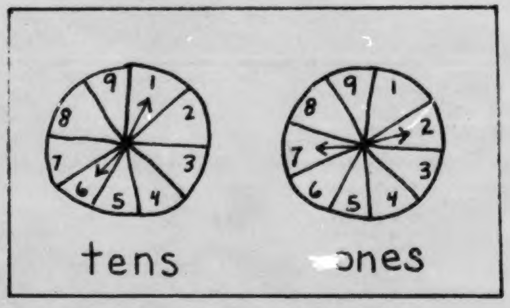
OBJECTIVE: The student will be able to recognize place value:

(1) ones and tens 1-2 *2
(2) through hundreds 2-3 *3
(3) through thousands 3-4 *4
(4) through hundred thousands 4-5 *5

ACTIVITIES

1. Play a card game with two stacks of small cards, expanded numerals for 10-30 in one stack and the two-digit numerals 10-30 in another stack. Each player may be given several expanded numeral cards and in turn draw a two-digit numeral. Each time the player gets a match, the player lays down the two matching cards. The player to discard all the cards first wins. If both children have unmatched cards, shuffle the discard pile, and reuse. Cards can be made in attractive shapes (fish, flowers, etc.).

2. See diagram below. Spin both spinners and have the children write on scratch paper the two-digit numeral for the number shown by the spinners. Have a child write the two-digit numerals on the board and have another child read the numeral aloud and tell how many tens and how many ones. (Can adapt to three spinners to include 100's place.)



3. "I Am Thinking of a Number" may be played with tens and ones. The child who is "it" might say, "I am thinking of 2 tens plus 4 ones." Another child writes or shows the numeral card for the two-digit numeral or 24 in this case. If the child is correct, that child becomes "it."

CONTENT: Numeration

OBJECTIVE: The student will be able to:

1. Recognize place value of decimal numbers through thousandths. 5-7 *7
2. Identify the value of a digit in numbers through hundred thousandths place. 5-7

ACTIVITIES

1. Have the students work in pairs. Each student draws a row of four boxes. ☐ ☐ ☐ ☐ Taking turns, each student rolls a die (1-6) four times. After each roll, he or she writes the digit shown in any of the four boxes. Students must include a decimal point somewhere in their row of boxes. The student who makes a numeral for the greatest number scores a point. Repeat for numerals with 4-9 digits.

2. Let the students use hand calculations. Have them divide numbers such as the following by 10, 100, 1,000, and 10,000.

   A. 25
   B. 862
   C. 536.7

   Discuss with them the movement of the decimal point in each instance.

3. Write the following on separate cards. Make the digit 4 red each time.

   5.416
   0.468
   8.437
   7.495

   62.146
   17.348
   5.945
   82.648

   15.834
   5.524
   38.024
   16.374

   Shuffle the cards. Have the students find and read the numerals in which the red digit is in the tenths place and put these cards in a stack. Repeat with hundredths and thousandths.

CONTENT: Numeration

OBJECTIVE: The student will be able to read and write expanded numbers using proper concepts of place and total value through billions. 6-8

ACTIVITIES

---

1. Draw a diagram similar to the one below on the chalkboard or overhead projector. Write in the headings, "ones," "thousands," etc. Ask students to help you complete the chart.

	Billions			Millions			Thousands			Ones		
	Hundred billions	Ten billions	Billions	Hundred millions	Ten millions	Millions	Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
a	7	5	4	6	8	2	1	0	3	2	9	5
b			3	6	9	8	2	1	4	7	2	6

Write some numerals in the chart and ask such questions as:

How many billions (thousands, millions) are in (a)?

How many thousands (ones, billions) does (b) contain?

2. Have students bring information to class relating to large numbers. Have them convert from word names to Arabic numerals and from Arabic numerals to word names. The following examples illustrate what they might bring:

   a. The Gemini 6 and Gemini 7 space ships were the first to rendezvous in space. Gemini 7 set the record for the longest distance traveled in space up to that time: 5,129,400 miles (five million, one hundred twenty-nine thousand, four hundred miles).

b. During the first 6 months of a recent year the American people flew about 39,366,633,000 miles on commercial airlines (thirty-nine billion, three hundred sixty-six million, six hundred thirty-three thousand miles). This represents a distance of about one million, five hundred sixty thousand times around the earth at the equator! (1,560,000)

3. Prepare a deck of 24 cards. On 12 of the cards, write a 12-digit number, circling a different place value on each one. Write the names of the place value on the other 12 cards.

612, 347, 908, 562

Millions

The game is played similarly to "Old Maid." Deal out all the cards (3-6 players). Players match digit cards with the correct place value name and lay them on the table. The players take turns drawing from the person on their right. The person who uses all of his cards first wins.

CONTENT: Numeration

OBJECTIVE: The student will be able to group concrete and semi-concrete objects in tens (limit to 10 groups). 1-2 *2

ACTIVITIES

---

1. Have students show that 10 ones make one group of 10 by moving one bead over at a time on the abacus. Then have students count sets of sticks until they have 10 ones grouped together. Provide yarn or rubber bands to secure the groups.

2. Distribute newspaper pages that have many numerals. Give each child a copy of a worksheet with a list such as 3 tens, 2 tens, 7 tens, etc. Tell the children to find and paste down numerals that have 3 tens (any numeral from 30 to 39).

   (Variation) Put list of numerals on board or give a cut-out section of numerals such as page numbers from index, phone book, etc.

3. Give each student 20 sticks and 2 cans. Ask the students to place the sticks into the cans in sets of 10.

CONTENT: Numeration

OBJECTIVE: The student will be able to rename numbers given in exponential form such as 5^2, 6^3, 3^4, 10^5. 7-9 *9

ACTIVITIES

1. Write each of the following 8 expressions on separate cards.

$x^2 + 2$ $x^2 + 4$

$x^1 + x^2$ x^3

$x^4 - 6$ $x^0 + 7$

$x^2 + 3$ $x^1 + 7$

Make a spinner with the numerals 1-4. Shuffle the cards and stack face down. Students take turns drawing a card and spinning the spinner. The student substitutes the value shown on the spinner for the letter in the expression. Then the student evaluates the expression and records the answer as a score. The first student to score 100 wins.

2. Have the students determine the value of each of these:

a. If $a = 1/6$, then $a^2 =$ ________ 1/36

b. If $x = 1/2$, then $x^4 =$ ________ 1/16

c. If $c = 3/8$, then $c^3 =$ ________ 27/512

d. If $m = 1/2$, then $5m^3 =$ ________ 5/8

e. If $d = 2/7$, then $3d^2 =$ ________ 12/49

f. If $e = 1/3$, then $2e^3 =$ ________ 2/27

g. If $b = 2/5$, then $4b^2 =$ ________ 16/25

h. If $y = 2/3$, then $2y^3 =$ ________ 16/27

i. If $z = 1/2$, then $10z^4 =$ ________ 5/8

3. Divide the group into teams. Have the first person on each team go to the chalkboard. Give them a number such as 5^2, 3^4, 6^3. Have them write out the mathematical sentence indicated and solve ($5^2 = 5 \times 5 = 25$). Score a point for each correct answer.

CONTENT: Numeration

OBJECTIVE: The student will be able to write a standard number in expanded form using exponential notation. 6-8

ACTIVITIES

1. Have each student write five numerals, using four to seven digits in each. Students exchange papers and use exponents to show the expanded notation. They return the papers for checking.

2. Have the students use reference books to find out the distances of all the planets from the sun. Have the students write the distances in expanded notation using exponents.

3. On separate cards write these numerals: 400; 4000; 40,000; 400,000; 4,000,000; 900; 9000; 90,000; 900,000; 9,000,000. On ten other cards write the following:

   4×10^2; 4×10^3; 4×10^4; 4×10^5; 4×10^6; 9×10^2; 9×10^3; 9×10^4; 9×10^5; 9×10^6.

   Students match each numeral with its name shown using a base of 10 and exponent.

4. Write words with exponents.

   Mississippi = $M\ i\ s^2\ i\ s^2\ i\ p^2\ i = M^1\ i^4\ s^4\ p^2$
   Connecticut =
   Tennessee =
   Massachusetts =
   Commencement =
   Savannah =
   Attitude =
   Suspicious =
   Assessment =
   Mathematician =
   Committee =
   Shakespeare =

CONTENT: Numeration

OBJECTIVE: The student will be able to identify and use the symbols +, -, =. 1-2 *2

ACTIVITIES

1. Give the children cards with problems written on them without the correct sign. Let the children decide which sign should be placed in each problem. Example:

$\boxed{5 \; \square \; 5 = 10}$ $\boxed{3 \square 2 = 1}$ $\boxed{+}$ $\boxed{-}$

2. Give the children cards with numerals, plus sign, subtraction sign, and equal sign written on them. Let the children make their own number sentences. Example:

$\boxed{5}$ $\boxed{+}$ $\boxed{3}$ $\boxed{=}$ $\boxed{8}$

$\boxed{10}$ $\boxed{-}$ $\boxed{2}$ $\boxed{=}$ $\boxed{8}$

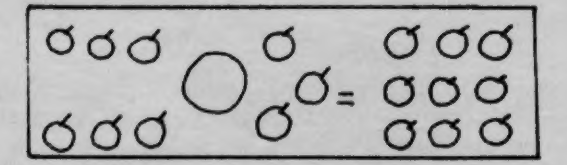
3. Using the flannelboard, place two objects on one side and three objects on the other. Have the children tell you how many objects there are in each set (2 and 3). Put all the objects together and ask the children how many there are. Do this same exercise again, this time writing the number sentence (2 + 3 = 5). Have the children take turns placing the equations on the flannel board.

CONTENT: Numeration

OBJECTIVE: The student will supply an operation sign for a number sentence. 2-3

ACTIVITIES

1. In order to help a child determine the correct operation for sentences such as 6   3 = 9, prepare a sketch similar to the following:



Prepare similar cards to help them visualize the solution.

2. Divide the students into two groups. Have each team create number sentences without the sign. Students exchange the sentences and supply the missing sign.

3. Give students coke caps or blocks and cards with problems similar to the following:

6 ○ 3 = 9   7 ○ 4 = 3

2 ○ 4 = 6   3 ○ 7 = 10

Have students use the blocks to determine what the operational sign should be.

CONTENT: Numeration

OBJECTIVE: The student will be able to:

(1) Compare the numbers, 0-99, using and . 1-3 *3

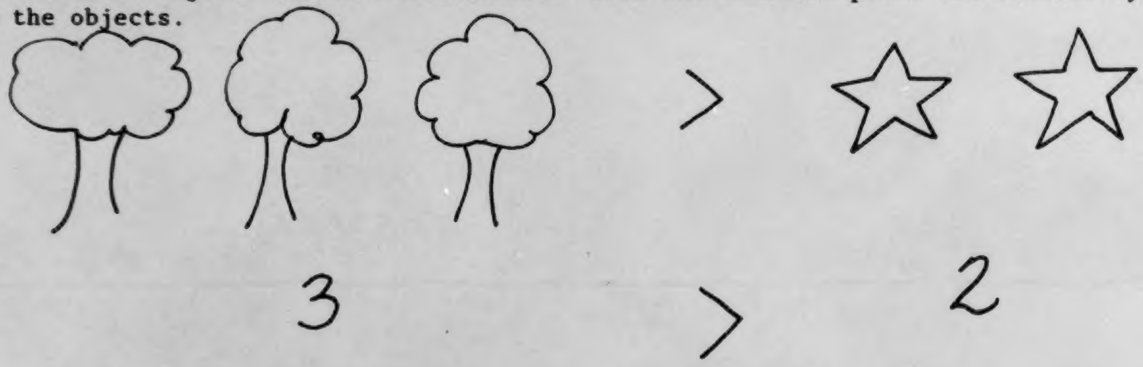
(2) Recognize the symbols for and . 1-4 *4

ACTIVITIES

1. Give each child two cards with numerals written on them. Put a greater than sign and a less than sign on the chalkboard. Have each child place the number that is greater or less on the correct side of the symbol.

2. Provide the children with two sets of numeral cards labeled 0 through 10, and two cards labeled with the inequality symbol. Divide the children into two teams. Give each team a set of cards. Have the children stand on opposite sides of the room. Explain to the children that you will call out two numbers. Three children from each team, the two holding the two numerals called and one holding the symbol, are to come to the front and arrange themselves in correct order. The first team to arrange themselves in correct order wins a point for their team. The team with the most points wins the game.

3. Place two sets of objects on the flannelboard. Have the children place the correct symbol (   ) between the objects.



CONTENT: Numeration

OBJECTIVE: For numbers through 100,000 the student will be able to:
(1) state which of two numbers is greater. 3-5
(2) state which of a given set of equalities or inequalities is true. 3-6
(3) write inequalities as 243 > 229. 4-6

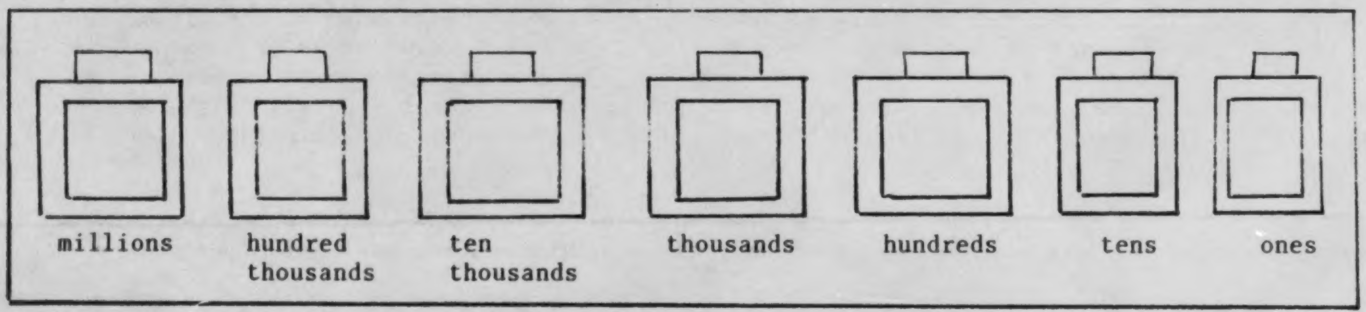
ACTIVITIES

---

1. Write the symbols < and > on cards. Put random numerals through 100,000 in a box. Students choose two numerals from the box and place one of the symbols between the numerals. $\boxed{99{,}000}$ $\boxed{>}$ $\boxed{9{,}000}$

2. A student thinks of a number and writes it down. Another student tries to guess the number by naming a number and then being told whether it is smaller or greater. The student continues to guess numbers until eventually the original number is discovered. Times taken to discover each number may be recorded and compared.

3. Construct from poster paper and library pockets two place value grids and 14 sets of number cards 0 to 9, one set for each place. The student draws two numerals from a box containing random numerals through 100,000. He places the numbers on the two grids and determines the greater number by looking first at the place of highest value. If the two numbers are the same, he looks at the next higher number, continuing downward until the greater number is found.



Cut a hole for the card to show through.

CONTENT: Numeration

OBJECTIVE: The student will be able to apply the missing mathematical symbols correctly:
,   , =, +, ÷, x, -,   . 3-4 *4

ACTIVITIES

1. Have students supply the missing symbol to make each statement true.

(1) 25 _____ 5 = 5
(2) 5 _____ 6 = 30
(3) 10 _____ 6
(4) 5 _____ 8 = 40
(5) 20 _____ 30
(6) 20 _____ 5 = 4
(7) 3 + 2 _____ 1 + 4
(8) 10 - 5 = 2 _____ 3

2. Have students tell what operation was performed upon the numbers in parentheses to get the number in the square.

(5,6) $\boxed{30}$ _____
(12,4) $\boxed{3}$ _____
(40,8) $\boxed{5}$ _____
(3,6) $\boxed{18}$ _____
(1,0) $\boxed{0}$ _____
(2,0) $\boxed{0}$ _____
(0,5) $\boxed{0}$ _____
(20,20) $\boxed{1}$ _____

3. Have the students make a set of cards with a symbol written on each one. Then make 2 sets of digit cards for the numerals 1-9. Put the symbol cards in one bag and the digit cards in another bag. Divide the students into small groups so they may work together. Have them draw 2 digit cards and one symbol card and make a mathematical sentence with the cards. Some sentences may result in having the group supply another number and/or symbol. Example:

$$\boxed{9}\ \boxed{+}\ \boxed{3} \quad = \quad 12$$

Students would have to supply the = and 12.

CONTENT: Numeration

OBJECTIVE: The student will be able to determine the equality relationship between given groups of numbers and specified operations using the symbols >, =, <. 4-6 *6

ACTIVITIES

1. Have each student write a two or three digit numeral on separate cards. Put all the cards in a containers. Taking turns, students draw three cards, and use the three numerals to write an addition or subtraction sentence, e.g., 91 + 154 ○ 472. The remaining students copy the sentence, perform the computation, and write =, >, < to make the sentence true.

2. Give groups of three students a set of cards with exercises similar to the following:

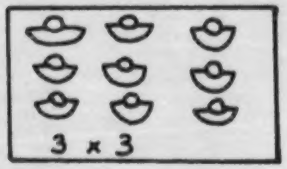
   (a) 3 x 67 ○ 201 (b) 4 x 53 ○ 387

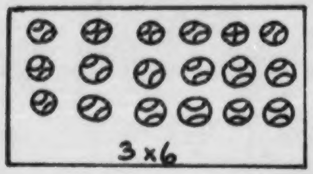
   (c) 15 + 20 + 30 ○ 42 + 6 + 12

   Taking turns, students draw a card and, without performing the given operation, decide whether =, >, or < makes the sentence true. Then, all three students perform the operation. If the student chose the correct sign, he or she scores a point.

3. Give students a set of cards with groups of objects pictured on each. The cards may be made by cutting and mounting pictures from catalogues and labeling each card with the appropriate operation. Students choose a pair of cards and write a sentence to show comparison of the two groups.

Example:





$3 \times 3 \; \textcircled{<} \; 3 \times 6$

$9 \; \textcircled{<} \; 18$

CONTENT: Numeration

OBJECTIVE: The student will be able to:

(1) Read and write Roman numerals (1-39). 5-10

(2) Express the following Roman numerals in Arabic numerals: I, V, X, L, C, D and M. 4-6

(3) Identify and read Roman numerals from 1-300. 4-8

ACTIVITIES

1. Prepare a chart for students to refer to when translating Roman numerals into the decimal numerals.

ROMAN NUMERALS

Symbols:

I	V	X	L	C
1	5	10	50	100

1. Add the numbers:
   (a) when the numerals are the same: XX = 10 + 10 = 20

   (b) when the greater numeral is first: XVI = 10 + 5 + 1 = 16

2. Subtract when a smaller numeral is before a larger numeral:
   XC = 100 - 10 = 90

2. Make a card game using fifty-two 3" x 5" index cards. Put a Roman numeral from 1 to 300 on each card. Students play "battle" using the Roman numerals.

3. Make a set of Roman numeral cards using a heavy paper. Make four of each of these:

   $\boxed{\text{I}}$ $\boxed{\text{X}}$ $\boxed{\text{C}}$

   Make one of each of these: $\boxed{\text{V}}$ $\boxed{\text{D}}$ $\boxed{\text{L}}$

   On the back of each card, put the decimal value. After being given a numeral, the student shows it with the cards.

$$\boxed{C} \quad \boxed{C} \quad \boxed{X} \quad \boxed{L} \quad \boxed{1} \quad \boxed{1} \quad \boxed{1}$$

Then turn the cards over showing the decimal number and determine the value. Remind the student that when a smaller number precedes a larger number, he must subtract that number rather than add it to the larger number.

Example:

$$\boxed{100} \quad \boxed{100} \quad \boxed{10} \quad \boxed{50} \quad \boxed{1} \quad \boxed{1} \quad \boxed{1}$$

$$100 + 100 + \overset{40}{(50 - 10)} + 1 + 1 + 1$$

CONTENT: Numeration

OBJECTIVE: After reviewing Roman numerals, the student will be able to give both the decimal numeral and Roman numeral for a number. 5-8

ACTIVITIES

1. Discuss the following chart with the students to show how to change Roman numerals to Arabic and vice versa.

Arabic Numerals	1	4	5	9	10	40	50	90	100	400	500	900	1000
Roman Numerals	I		V		X		L		C		D		M
Special Pairs of Roman Numerals		IV		IX		XL		XC		CD		CM	

Have them write Roman numerals for numbers such as:

22 (XXII)	959 (CMLIX)	61 (LXI)	704 (DCCIV)	99 (XCIX)
18 (XVIII)	111 (CXI)	39 (XXXIX)	1300 (MCCC)	49 (XLIX)

Have them write Arabic numerals for:

XVI (16)	CXX (120)	XXIX (29)	XLV (45)
XXIV (24)	XXVII (27)	MCD (1400)	MMCCII (2202)

2. Give the students some famous dates written in Roman numerals. Have them determine the Arabic equivalents and tell why the dates are important. Here are some sample dates:

   a. MCDXCII (1492)
   b. MDCVII (1607)
   c. MDCCLXXVI (1776)
   d. MCCXV (1215)
   e. MCMXVII (1917)
   f. MCMXLI (1941)

3. Have such things as a clock face with Roman numerals, a set of reference books numbered with Roman numerals. Let the students select a number and challenge them to give the corresponding Arabic numeral. Then ask them to represent in Roman numerals many numbers from their experience such as their lunch money, their age, the number of brothers and sisters they have, the number of students in the class, etc.

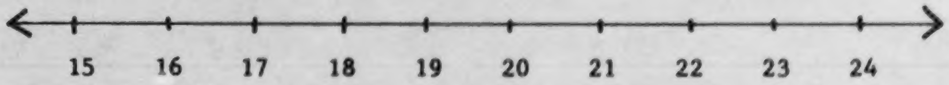
CONTENT: Numeration

OBJECTIVE: The student will be able to round numbers:
(1) to the nearest ten. 4-6 *6
(2) to the nearest hundred. 5-7 *7
(3) to the nearest thousand. 5-8 *8

ACTIVITIES

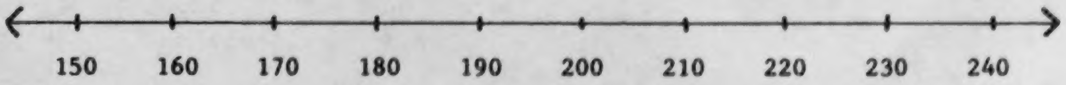
1. Use a numeral line to illustrate rounding numbers to the nearest ten, hundred, and thousand.

   a. Rounding to the nearest ten


15
16
17
18
19
20
21
22
23
24

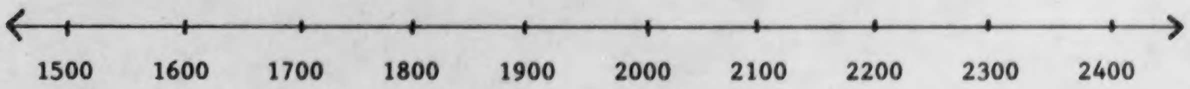
All these numbers rounded to the nearest ten are 20.

   b. Rounding to the nearest hundred (use the same number line and add zeros to show the similarity in rounding to the nearest hundred)


150
160
170
180
190
200
210
220
230
240

All these numbers rounded to the nearest hundred are 200.

   c. Rounding to the nearest thousand (add another zero to show the similarity in rounding to the nearest thousand)


1500
1600
1700
1800
1900
2000
2100
2200
2300
2400

All these numbers rounded to the nearest thousand are 2000.

625

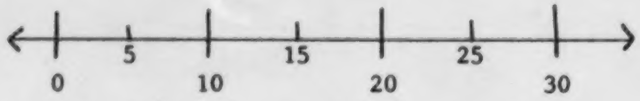
624

2. Divide students into teams. Provide each team member with a magic slate. Call out numbers to be rounded off to the nearest ten, hundred or thousand. Students write the nearest numeral on the slate and hold it up. The first slate up scores a point for his team.

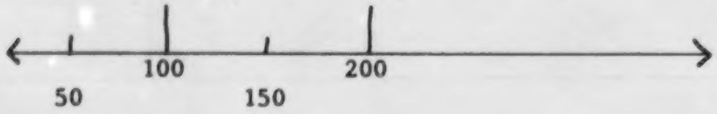
3. Use masking tape numeral lines on the floor - one for tens, hundreds, and thousands. Given a number, the student stands on that numeral and sees how many steps he must make to get to the two nearest tens, hundreds, or thousands. Remind the student that when the distance is equal, he must round up.

4. (Variation) Have students draw numeral lines with rulers for:

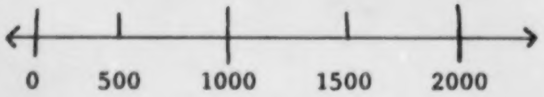
(1) tens



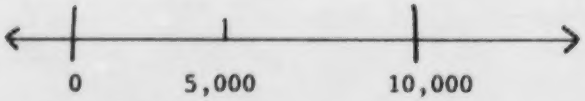
(2) hundreds



(3) thousands



(4) ten thousands



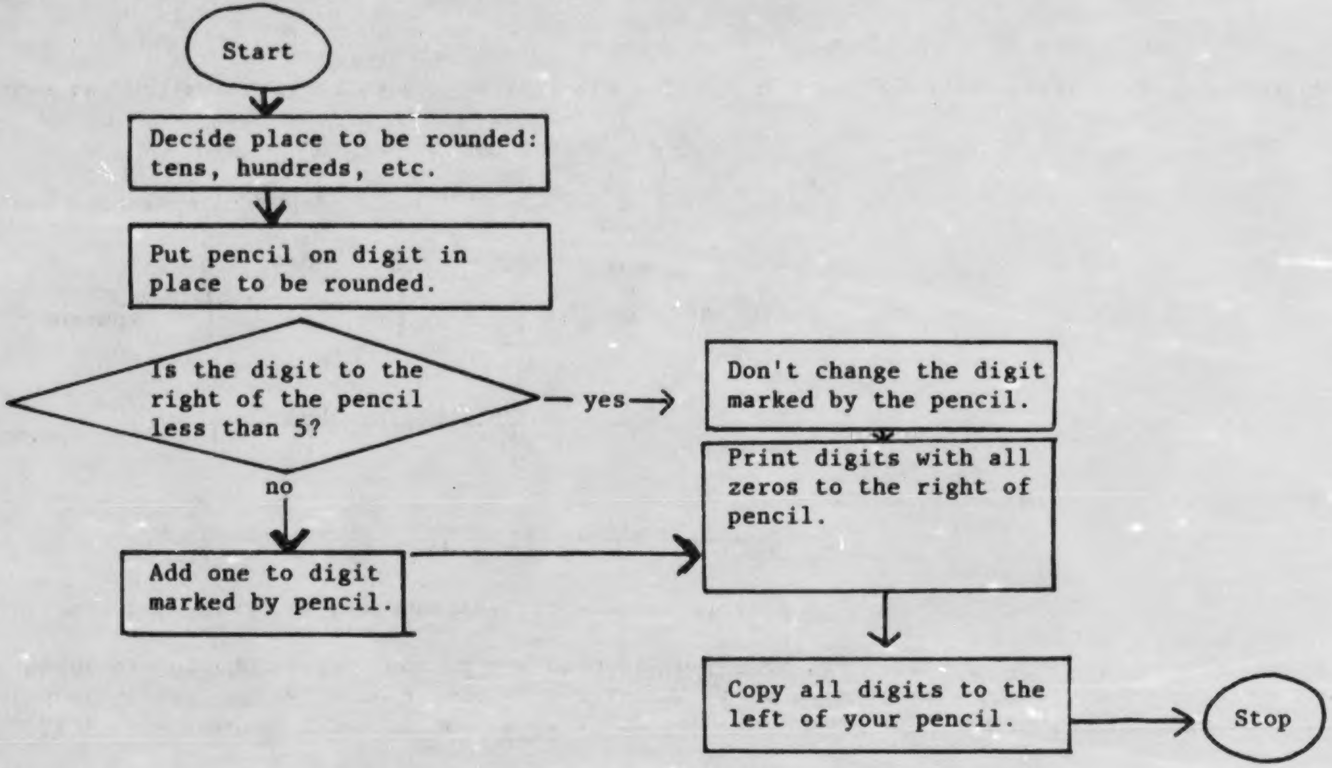
and show the halfway mark on each. Go over the rule "5 or more rounds up--less than 5 rounds down."

CONTENT: Numeration

OBJECTIVE: The student will be able to round numbers to any specified place value through one million. 6-9 *9

ACTIVITIES

1. Present the following flow chart to the class.


Start
Decide place to be rounded: tens, hundreds, etc.
Put pencil on digit in place to be rounded.
Is the digit to the right of the pencil less than 5?
yes
Don't change the digit marked by the pencil.
no
Add one to digit marked by pencil.
Print digits with all zeros to the right of pencil.
Copy all digits to the left of your pencil.
Stop

Discuss situations in which it is better to be exact and situations in which it is better to round off. Examples:

a. One's paycheck
b. Distance to sun from earth
c. Bricks in a house
d. Length of one's foot

Have them round off several numbers to different positions using a chart like the following:

Round to nearest

	10	100	1,000	1,000,000
a. Fish in a lake 106,532	106,530	106,500	107,000	1,000,000
b. People in large city 3,682,431	3,682,430	3,682,400	3,682,000	4,000,000
c. Miles to sun 92,687,893	92,687,890	92,687,900	92,688,000	93,000,000
d. Population of USA 203,184,772	203,184,770	203,184,800	203,185,000	203,000,000

2. Give the students problems such as the following, having them choose the number that does NOT fit in the statement.

a. ___(2)___ rounded to the nearest ten is not 560.
(1) 558 (2) 552 (3) 555

b. ___(3)___ rounded to the nearest hundred is not 600.
(1) 649 (2) 550 (3) 650

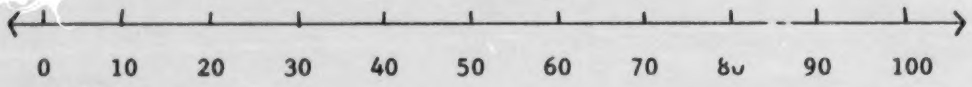
c. ___(1)___ rounded to the nearest thousand is not 1,000.
(1) 1762 (2) 1025 (3) 985

d. ___(3)___ rounded to the nearest hundred thousand is not 160,000.
(1) 161,268 (2) 159,412 (3) 165,320

e. ___(1)___ rounded to the nearest hundred thousand is not 900,000.
(1) 952,642 (2) 926,015 (3) 895,216

f. ___(2)___ rounded to the nearest million is not 58,000,000.
(1) 57,672,800 (2) 58,926,300 (3) 58,361,400

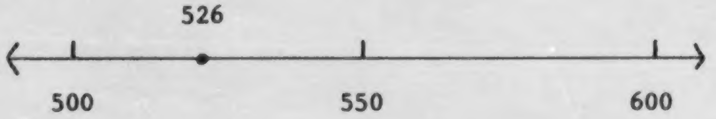
3. Have students round numbers to the nearest ten by using a ten number line.


0
10
20
30
40
50
60
70
80
90
100

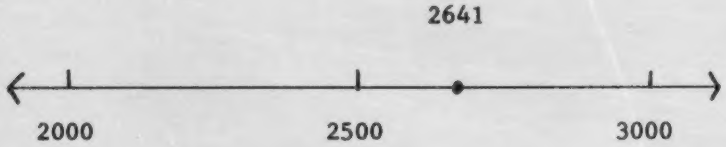
a. 78 (80) b. 43 (40) c. 16 (20) d. 86 (90)

This activity may be extended to include rounding numbers to the nearest hundred, thousand, etc.

e. 526 (500)


526
500
550
600

f. 2641 (3000)


2641
2000
2500
3000

CONTENT: Numeration

OBJECTIVE: The student will:
(1) identify prime numbers less than one hundred. 5-7 *7
(2) identify composite numbers. 5-8

ACTIVITIES

1. Write the numerals 1 to 30 on the chalkboard, one below the other. Ask the students to list the factors of each of the numbers. Circle each numeral which has exactly two factors and define prime numbers as such. Have students box in the numerals in the list that have more than two factors. Define those as composite numbers. Tell the students that 1 and 0 are not considered prime or composite since 1 has only one factor and 0 has an infinite number of factors. Remind the students that 0 multiplied by any number is 0.

2. Have students list the pairs of primes less than 50 that have a difference of 2; a difference of 10.

   3,5; 5,7; 11,13; 17,19; 29,31; 41,43; 3,13; 7,17; 13,23; 19,29; 31,41; 37,47.

   (Give students copies of divisibility rules p. 396)

   Try this:

   Can all odd numbers greater than 5 and less than 102 be obtained by adding three prime numbers? Try it!

   7 = (2) + (2) + (3)
   9 = (3) + (3) + (3)
   11 = (5) + (3) + (3)

   Continue through 101 = ____ + ____ + ____

3. Have students do the following activity:

   a. Copy the chart.
   b. Cross out 1 since it is not a prime number.
   c. Circle 2. Cross out all multiples of 2.
   d. Circle 3. Cross out all multiples of 3.
   e. Circle 5. Cross out all multiples of 5.
   f. Continue until all numbers are either circled or crossed out.

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

Then you may have them to do the same activity using a chart of 50 or 100.

CONTENT: Numeration

OBJECTIVE: The student will be able to find the possible factors of a number less than 100. 5-7

ACTIVITIES

---

1. Let the students work in pairs. Taking turns, students think of a number from 30 to 99 and list all the factors in order. Write the factors as a set in numerical order by placing one and the number chosen as the first and last factor. Example: 48 (1........48) using divisibility rules begin with 2 x ☐, 3 x ☐, etc., until two factors like (6x8) or a double factor (6x6) fall next to each other in your series. This gives all possible factors (1........6/8..........48).

2. Use activity 1, having students use numbers from 100 to 200.

3. Let the students work in pairs. Each student needs numeral cards 1-20. Each student shuffles the cards and stacks them face down. Both draw their top card and list the factors of the number in the card. The student whose number has more factors scores a point. Repeat with the remaining cards. The student with more points wins.

CONTENT: Numeration

OBJECTIVE: The student will be able to find the common factors of two or more numbers less than 100. 5-8

ACTIVITIES

---

1. Have the students work in pairs. Each student takes a list of numerals.
Example:

List A	List B
24	18
27	45
18	36
40	32
36	48
25	75
60	24

Each student lists all the factors for the first numeral on his or her list. They should check each other's work and then list the common factors for the two numbers. Continue with the remaining numerals.

2. Write words such as "madam," "radar," and "wow" on the board. Show students that backward or forward, these words are the same; they are palindromes. Have students name numbers that are palindromes, e.g., 131, 2662, 45954. Then have the students find the greatest common factors for each pair of numbers below. They will know if their work is correct if their answers form a palindrome.

40, 48	24, 16	72, 81	18, 45	36, 27	40, 32	32, 8
8	8	9	9	9	8	8

3. Write the following numerals in the sections of a spinner: 16, 18, 20, 24, 28, 30, 32, 36. A student spins the spinner, then lists all the factors of the number indicated. Another student uses an answer key to check.

16: 1, 2, 4, 8, 16

18: 1, 2, 3, 6, 9, 18

20: 1, 2, 4, 5, 10, 20

24: 1, 2, 3, 4, 6, 8, 12, 24

28: 1, 2, 4, 7, 14, 28

30: 1, 2, 3, 5, 6, 10, 15, 30

32: 1, 2, 4, 8, 16, 32

36: 1, 2, 3, 4, 6, 9, 12, 18, 36

640

CONTENT: Numeration

OBJECTIVE: The student will be able to write a number as the product of prime factors. 5-8

ACTIVITIES

1. Have the students prepare a set of twenty 3" x 6" composite numeral cards and a set of fifty prime numeral cards about the size of ordinary playing cards. Two to four people can play. Place four composite numeral cards face up on the table and set the remaining cards aside. Shuffle and deal nine prime numeral cards to each player and place the remaining cards face down next to the four composite numeral cards.

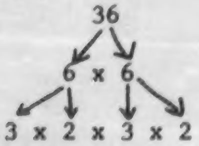
   The player to the left of the dealer begins by playing a required prime factor on any one of the composite numerals - if he does not have a prime factor that plays, he must draw a card from the factor pile. Play moves to the next player who must play a prime factor or draw. A player who completes the prime factorization of a composite number picks up the composite numeral and its prime factors and places them in front of him, to be counted at the end of the hand. Play continues until the four composite numeral cards are gone or until some player has no more prime numeral cards.

   Score 5 points for each composite numeral card and 1 point for each prime factor card claimed during the hand.

   To deal another hand, choose four more composite numeral cards and redeal the prime numeral cards.

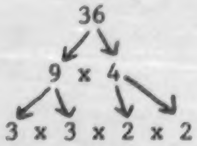
2. Show the students how to do factor trees. Point out that the trees may not be identical but the end result will be. For example:

I



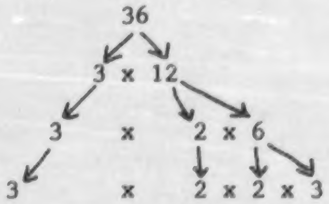
$36 = 2^2 \times 3^2$

II



$36 = 2^2 \times 3^2$

III

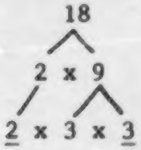


$36 = 2^2 \times 3^2$

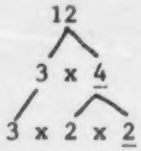
Have students do several factor trees for each of the following composite numbers: 48, 72, 64, 54, 56.

3. Give the students partially completed factor trees and have them fill in the missing factors.

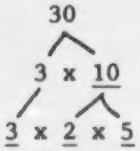
A.


18
2 x 9
2 x 3 x 3

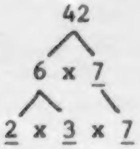
B.


12
3 x 4
3 x 2 x 2

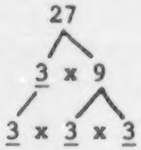
C.


30
3 x 10
3 x 2 x 5

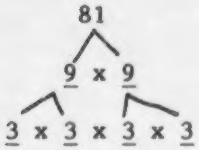
D.


42
6 x 7
2 x 3 x 7

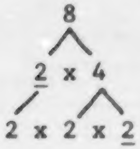
E.


27
3 x 9
3 x 3 x 3

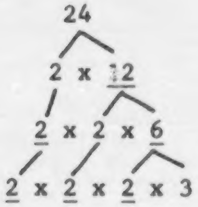
F.


81
9 x 9
3 x 3 x 3 x 3

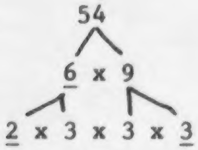
G.



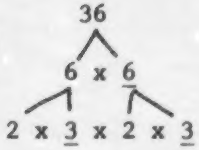
H.


24
2 x 12
2 x 2 x 6
2 x 2 x 2 x 3

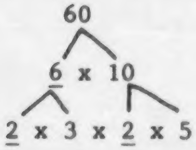
I.


54
6 x 9
2 x 3 x 3 x 3

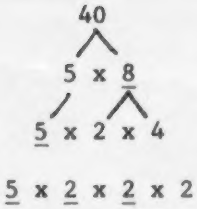
J.


36
6 x 6
2 x 3 x 2 x 3

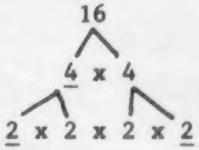
K.


60
6 x 10
2 x 3 x 2 x 5

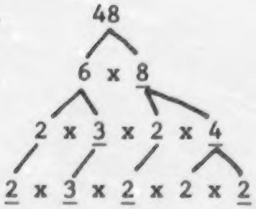
L.


40
5 x 8
5 x 2 x 4
5 x 2 x 2 x 2

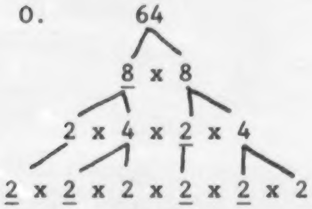
M.


16
4 x 4
2 x 2 x 2 x 2

N.


48
6 x 8
2 x 3 x 2 x 4
2 x 3 x 2 x 2 x 2

O.


64
8 x 8
2 x 4 x 2 x 4
2 x 2 x 2 x 2 x 2 x 2

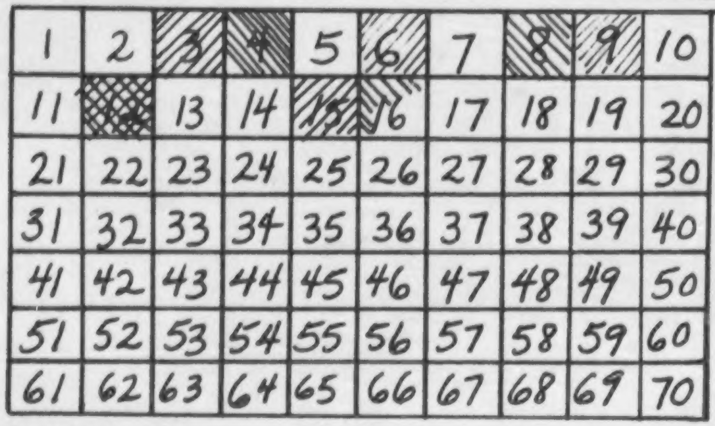
CONTENT: Numeration

OBJECTIVE: The student will be able to find common multiples of two or more numbers less than 30.

5-8

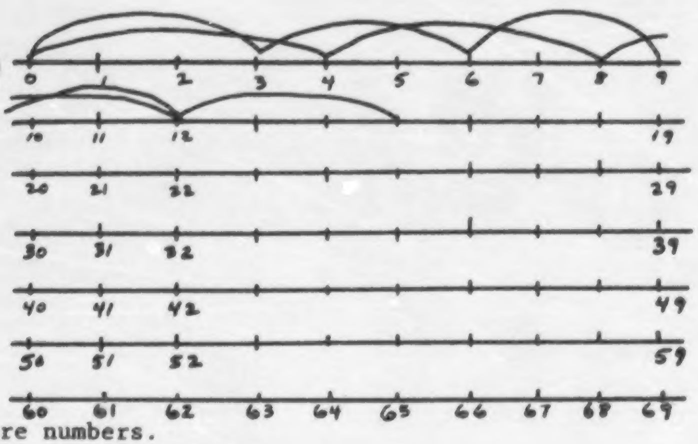
ACTIVITIES

1.



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70

Multiples
of 3
(color blue)
and 4
(color
yellow)

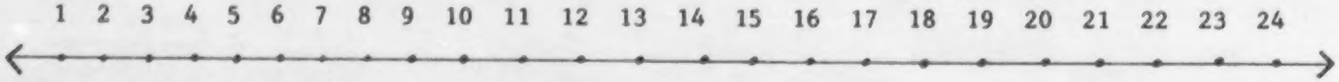

0 1 2 3 4 5 6 7 8 9
10 11 12 19
20 21 22 29
30 31 32 39
40 41 42 49
50 51 52 59
60 61 62 63 64 65 66 67 68 69

2. Have the students find the common multiples for three or more numbers.

- a. 2, 3, 6
- b. 2, 4, 5
- c. 3, 5, 6
- d. 6, 9, 12
- e. 4, 8, 12
- f. 4, 6, 8, 12
- g. 2, 3, 4, 5

3. Give each student number lines like the one below. For each exercise, students use two colors on a number line to show the hops. Then they list the numbers common to both numbers.

a.	Hops of 4.	Hops of 3.	12, 24
b.	Hops of 2.	Hops of 5.	10, 20, 30
c.	Hops of 2.	Hops of 3.	6, 12, 18, 24, 30
d.	Hops of 3.	Hops of 5.	15, 30
e.	Hops of 4.	Hops of 6.	12, 24


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

CONTENT: Numeration

OBJECTIVE: The student will be able to define and identify the set of integers. 7-9 *9

ACTIVITIES

---

1. Have the students list as many real world situations as they can in which integers may be used to describe them.

   Examples:
   A. Find money, lose money
   B. Hours from now, hours ago
   C. Gain pounds, lose pounds
   D. Degrees above zero, degrees below zero

2. Give students problems such as the following:

   How much money would you have left if you earned and spent money as indicated here:

   Earned $6.00, spent $1.40
   Earned $2.25, spent $3.70
   Earned $4.00, spent $5.00
   Earned $7.25, spent $8.40
   ($1.00 would be left)

3. Make a deck of cards with positive integers on half the cards and the opposite negative integers on the other half of the cards. Deal all the cards out to three to five players. One player puts down a card. The player with the card showing the opposite of the card played, puts it down. This player also places down a new card to be matched. This procedure continues until one player, the winner, runs out of cards.

CONTENT: Numeration

OBJECTIVE: The student will be able to classify integers as a positive integer, zero, or a negative integer. 6-8

ACTIVITIES

1. Draw a number line. Mark the integers from 0-10 on it. Point out that the whole number 3 is 3 units to the right of zero. It is called a "positive 3." Extend the number line 3 units to the left of zero, that is, to the opposite of 3, or "negative 3."

   Whole numbers and their opposites are called integers. Every integer except 0 is either positive or negative.

   Have the student verbalize and point to the following integers and their opposites on the number line.

   a. 10 (ten, negative ten)
   b. -8 (negative eight, eight)
   c. 1 (one, negative one)
   d. -4 (negative four, four)
   e. 6 (six, negative six)

2. Is the number positive or negative?

   a. It is 3°C below zero. (negative)
   b. The child lost 25¢. (negative)
   c. The city is 30km above sea level. (positive)
   d. The temperature is 12° below zero. (negative)

3. Write positive or negative.

   a. 3 is a __________ integer. (positive)
   b. -7 is a __________ integer. (negative)
   c. -20 is a __________ integer. (negative)

649

650

CONTENT: Numeration

OBJECTIVE: The student will be able to illustrate integers as points on a number line. 7-9 *9

ACTIVITIES

1. Have students identify examples of number lines in everyday use and discuss them. Some examples are a ruler, thermometer, elevator. Have students show on a number line such things as:

   a. a gain of 5 pounds
   b. a loss of 2 inches
   c. a price decrease of 10¢
   d. a temperature of 16°C above zero
   e. a valley 8 yards below sea level

2. Have students locate points on a coordinate plane when given ordered pairs of integers. Example:

(-7, +7)	(-1, -2)	(+9, +7)	(+3, +4)
(+4, -8)	(-10, +7)	(+8, -8)	(+3, +11)
(+4, -5)	(-5, +1)	(-5, -7)	(+7, +1)

3. Build a deck of cards with pairs of integers opposite. Twenty pairs will be adequate (40 total).

   $\boxed{3}$ $\boxed{-3}$ $\boxed{6}$ $\boxed{-6}$ $\boxed{19}$ $\boxed{-19}$

   Deal out six cards to each player (maximum of four players). If a player has an opposite pair, he puts them on the table. The person to the dealer's right draws a card. If it is an opposite of one of his numbers, he puts down the pair and discards. Play continues to the right. The first person who has no cards remaining wins. If the deck has been gone through, reshuffle and continue.

CONTENT: Numeration

OBJECTIVE: The student will be able to identify opposites (additive inverse) as a pair of integers such as 8 and -8 whose sum is 0. 6-8

ACTIVITIES

1. Give the missing integer:

   a. -1 + ______ = 0 (1)
   b. ______ = 2 + -2 (0)
   c. 9 + -9 = ______ (0)
   d. ______ + 7 = 0 (-7)
   e. -6 - ______ = 0 (6)

2. Give the missing integer:

   a. 3 + (-2 + ______) = 0 (-1)
   b. 4 + (-2 + ______) = 0 (-2)
   c. 7 + (-5 + ______) = 0 (-2)

3. Give the missing integer:

   a. -1 + 1 = ______ (0)
   b. 5 + -5 = ______ (0)
   c. 8 = -8 = ______ (0)
   d. -12 + 12 = ______ (0)
   e. 75 + -75 = ______ (0)

CONTENT: Numeration

OBJECTIVE: The student will be able to order three or more integers beginning with the smallest. 6-8

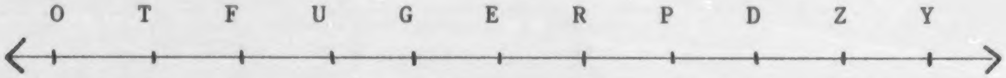
ACTIVITIES

1. On 15 cards write any positive integer between +1 and +20. On 15 other cards, write any negative integer between -1 and -20. Let three or four students play. Shuffle and deal out all the cards face down. Each student then turns over the top card. The player with the greatest number keeps all the cards played. Repeat until all cards are played. The student with the most cards is the winner.

2. Have the students arrange the places below in order from the lowest point to the highest.

a.	Mt. Blanc	15,780.8 feet
b.	Caspian Sea	-95.1 feet
c.	Lake Eyre	-37.4 feet
d.	Mt. Everest	29,028.8 feet
e.	Death Valley	-282 feet
f.	Mt. McKinley	20,321.5 feet
g.	Dead Sea	-1,289.4 feet
h.	Mt. Aconcoqua	0 feet

3. Have students complete the chart to spell out the message.



START	GO	END
T	+3	G
G	-4	O
P	-7	O
F	+6	D

START	GO	END
O	+2	F
Y	-10	O
U	+3	R

START	GO	END
E	+5	Y
R	-6	O
D	-5	U

CONTENT: Numeration

OBJECTIVE: The student will be able to determine absolute value of a given integer. 7-9 *9

ACTIVITIES

1. Discuss the meaning of absolute value of integers and the symbol used to denote absolute value. Have the students find the absolute number of several integers.

$|-4| = \underline{4}$ $|6| = \underline{6}$ $|7| = \underline{7}$

$|0| = \underline{0}$ $|-3| = \underline{3}$ $|26| = \underline{26}$

$|-9| = \underline{9}$ $|11| = \underline{11}$ $|-14| = \underline{14}$

2. Have the students compose absolute values of integers and denote by $>$, $<$, =.

$|0| \leq |-10$ $|-23| \leq |-24|$

$|-15| \equiv |+15$ $|-16| \equiv |+16|$

$|+50| \leq |-100$ $|+1| \leq |+3|$

$|-40| \geq |0$ $|-16| \geq |+15|$

3. Have the students use a number line to show the absolute value of integers. Have them write the correct symbol for the absolute value.

$|4| = 4$ $|-27| = 27$

$|-4| = 4$ $|27| = 27$

657

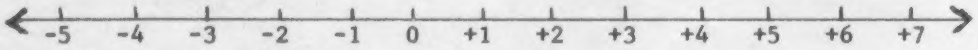
658

CONTENT: Numeration

OBJECTIVE: The student will be able to add integers. 7-9 *9

ACTIVITIES

1. Have students represent the sums by drawing arrows on a number line. Show that the first arrow always begins at zero, that a positive integer is represented by an arrow pointing to the right and that a negative integer is always an arrow pointing to the left.



Have students examine the sums and complete these statements:

a. The sum of two positive integers is a ________________ number.
b. The sum of two negative integers is a ________________ number.
c. The sum of a positive number and a negative number is sometimes a ________________ number and sometimes a ________________ number.

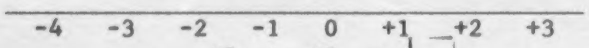
2. a. Have students find the missing numbers in the magic square.

b. Have students add +5 to each number of the square and determine if the result is a magic square.

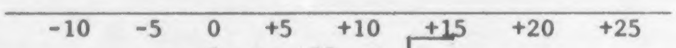
c. Have students add -4 to each number and determine if the result is a magic square.

+4	-10	-9	+1
-7	-1	-2	-4
-3	-5	-6	0
-8	+2	+3	-11

3. Give the students number line models for the addition of two integers and have them determine the sums. Examples:



+2 + +1 = ☐



-5 + +20 = ☐

-12
-10
-8
-6
-4
-2
0
+2
+4
+6
+8
+10
+12
+14

+8 + -12 = ☐

CONTENT: Numeration

OBJECTIVE: The student will be able to subtract integers. 7-9 *9

ACTIVITIES

1. Examine the following display with the students:

Subtraction	Addition
+6 - +2 = +4	+6 + -2 = +4
+6 - 0 = +6	+6 + 0 = +6
+6 - -2 = +8	+6 + +2 = +8
-6 - 0 = -6	-6 + 0 = -6
-6 - -2 = -4	-6 + +2 = -4
-5 - +1 = -6	-5 + -1 = -6

same answers

opposites

To subtract an integer, add its opposite:

+3 - +5 = +3 + -5 = -2

-6 - -3 = -6 + +3 = -6

Then have the students do such problems as:

+15 - +7 = +8

-8 - -3 = -5

+8 - +20 = -12

-21 - -12 = -9

+17 - +36 = -19

+10 - -4 = +14

-9 - +7 = -16

+16 - -9 = +25

-3 - -15 = +12

2. Use the code to fill in the blanks:

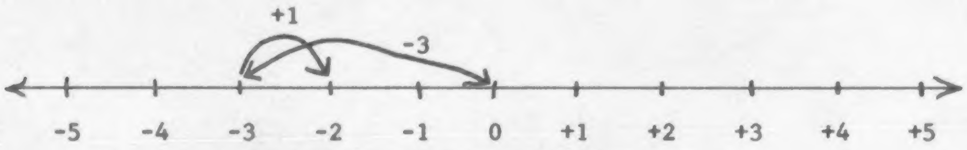
A	E	L	O	P	R	S	W
-1.5	-5.5	5.5	11.2	-13	3	-4	4

(1) -5.5 - -1.5 =
(2) +13-1/5 - +2 =
(3) +3.8 - -1.7 =
(4) +5-1/8 - +6-5/8 =
(5) 0 - -3 =
(6) -8 - +5 =
(7) -20.4 + +31.6 =
(8) -½ - -4½ =
(9) -2.1 - +3.4 =
(10) +4-1/3 - +1-1/3 =

S	O	L	A	R		P	O	W	E	R
1	2	3	4	5		6	7	8	9	10

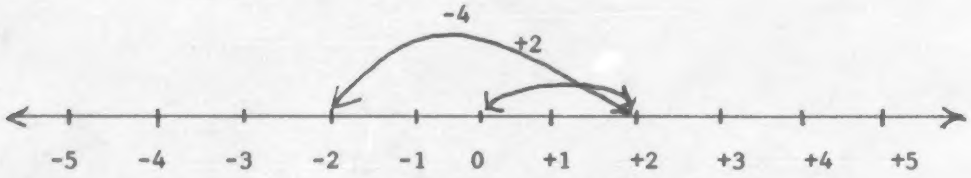
3. Have students make up simple subtraction equations. After they have been solved, ask for volunteers to explain how they obtained their answers using a number line.

a. -2 - -3 = ☐ can be expressed as -3 + ☐ = -2



$\boxed{-3 \quad + \quad \boxed{+1} \quad = \quad -2}$

b. -2 + +2 = ☐ may be written +2 + ☐ = -2



$\boxed{+2 \quad + \quad \boxed{-4} \quad = \quad -2}$

664

663

CONTENT: Numeration

OBJECTIVE: The student will be able to multiply integers. 6-8

ACTIVITIES

---

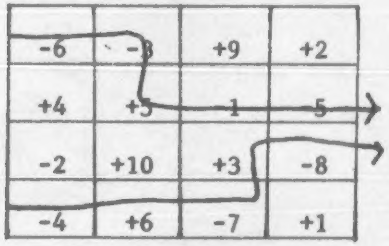
1. Go over the following display with the students. Ask them to see if there is a pattern established by the table.

+6 x +3 = +18
+6 x +2 = +12
+6 x +1 = +6
+6 x 0 = 0
+6 x -1 = -6

-5 x +3 = -15
-5 x +2 = -10
-5 x +1 = -5
-5 x 0 = 0
-5 x -1 = +5

Have students give the next three entries in both patterns and formulate the rules for multiplying integers.

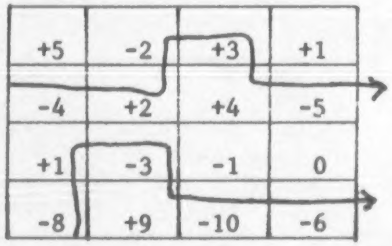
2. Have the students follow the paths to find the products.



-6	-3	+9	+2
+4	+5	-1	-5
-2	+10	+3	-8
-4	+6	-7	+1

+450

-4032



+5	-2	+3	+1
-4	+2	+4	-5
+1	-3	-1	0
-8	+9	-10	-6

-960

+12,960

3. Make two cards for each of the integers +1 to +9 and -1 to -9. Shuffle and stack face down between two cards and name the product. If the product is correct, the player keeps the cards. The opponent gets the cards when an incorrect product is named. After all cards are drawn, the player with more cards is the winner.

CONTENT: Numeration

OBJECTIVE: The student will be able to divide integers. 8-10 *10

ACTIVITIES

1. Review the relationship of multiplication and division using whole numbers. Then show how multiplication and division of integers are related using such things as the following:

+2 x +3 = +6 so +6 ÷ +2 = +3
-2 x +3 = -6 so -6 ÷ -2 = +3
+2 x -3 = -6 so -6 ÷ +2 = -3
-2 x -3 = +6 so +6 ÷ -2 = -3

Have the students complete equations such as:

+6 ÷ -3 = -2
+5 ÷ -5 = -1
-8 ÷ +2 = -4

-54 ÷ -6 = +9
+81 ÷ -9 = -9
-64 ÷ =16 = -4

-57 ÷ -57 = +1
-45 ÷ +15 = -3
-69 ÷ -23 = +3

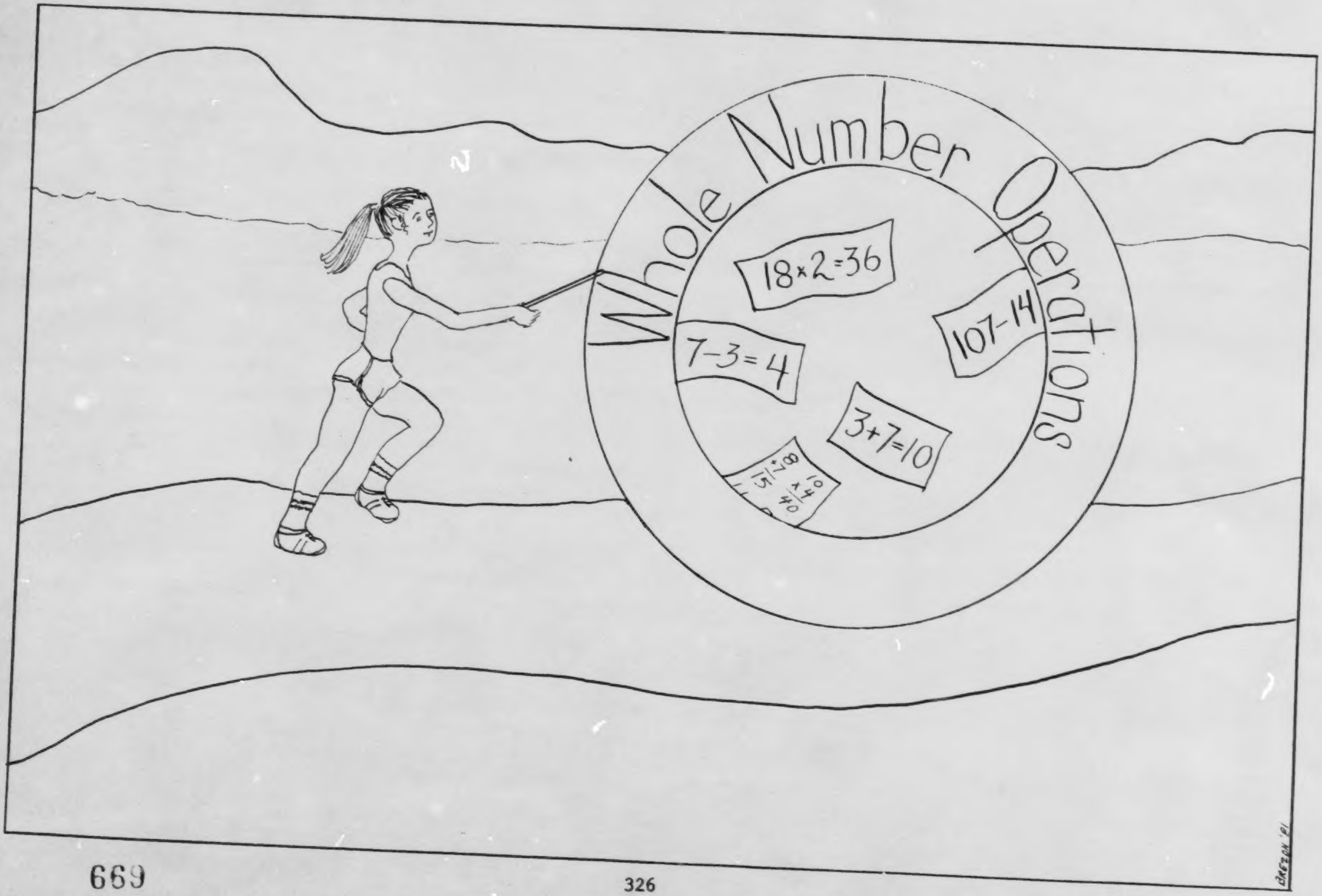
2. Have the students complete multi-step problems such as:

(-8 x +5) ÷ -2 = +20
(-8 + -6) ÷ -7 = +2
(+4 x -8) ÷ (-4 x +1) = +8

(-3 x -8) ÷ (-2 x +3) = -4
(-15 ÷ +3) + (-24 ÷ -6) = -1
(+18 ÷ -6) - (-12 ÷ +6) = -1

3. Give the students simple division tables such as the following and have them find the quotients.

	+1	-1	+2	-2	+3	-3	+6	-6
+6	+6	-6	+3	-3	+2	-2	+1	-1
-6	-6	+6	-3	+3	-2	+2	-1	+1
+12	+12	-12	+6	-6	+4	-4	+2	-2
-12	-12	+12	-6	+6	-4	+4	-2	+2
+18	+18	-18	+9	-9	+6	-6	+3	-3
-18	-18	+18	-9	+9	-6	+6	-3	+3
+24	+24	-24	+12	-12	+8	-8	+4	-4
-24	-24	+24	-12	+12	-8	+8	-4	+4


Whole Number Operations
18×2=36
107-14
7-3=4
3+7=10
8 +7 15
10 ×4 40

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to join two sets using sums 2 through 6. K

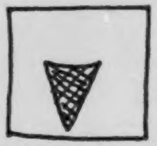
ACTIVITIES

1. Collect several paper or plastic cups. In two of the cups place one, two, or three objects. Have the children examine the contents of these two cups and give the cardinal number of the set of objects in each. Then empty both cups into a third cup and have the children give the cardinal number of this new set.

   Keep the total number of items down to 6 or less at the beginning.

   Materials: Paper or plastic cups, at least six objects.

2a. On the pieces of tagboard draw the ice cream cones.



   b. Cut out ice cream scoops from the colored felt. Glue the felt strawberry or chocolate flecks to the scoops.

   c. Let the student put the scoops of ice cream on the cones. Then let him record the combinations formed by the pieces of strawberry or chocolate. For example, one scoop may have a scoop of chocolate ice cream with 2 chocolate chips. The other scoop of ice cream may have 3 pieces of strawberries on it. The child would then write 2 + 3 = 5.

   *For the child who is not ready to write, have the numerals written on index cards

   $\boxed{2} + \boxed{3} = \boxed{5}$

   Materials: Pieces of 6"x9" tagboard or poster paper, brown marks-a-lot, colored felt for ice cream cones and flecks of strawberry or chocolate chips, paper for recording combinations.

3. With yarn, make three colored curves in a row on the flannelboard. Place three squares inside the curve on the left and two squares inside the curve on the right. Tell the number of squares

in each set. Call on a volunteer to join the sets by placing all the squares in the center curve then count them aloud. Summarize by saying, "Three squares and two squares are five squares. There are five sets altogether." Repeat the activity several times, using different shapes and sets together totaling 6 or less. Alternate using the terms "altogether" and "in all."

Materials: Flannelboard, yarn, flannel objects

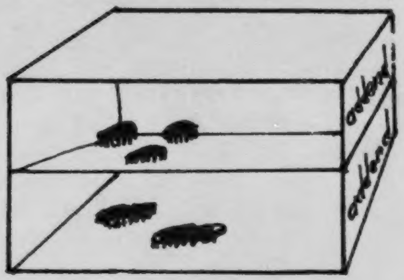
CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to identify the parts of an addition problem. 1-3 *3

ACTIVITIES

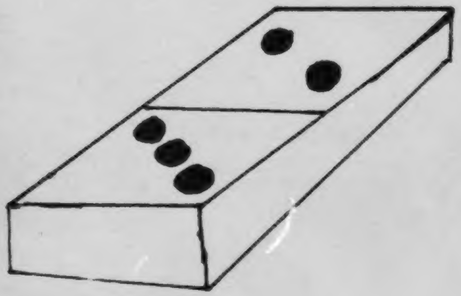
(All levels)

1. Objects placed on shelves may be used to help children see the vertical order of the demonstrated addends. Two large boxes, one placed on top of the other with the open sides toward the class, can serve as shelves. Smaller boxes can be used at the children's desks. After objects have been placed on the top and bottom shelves, children may then tell how many objects there are and express this relationship by writing its equation.

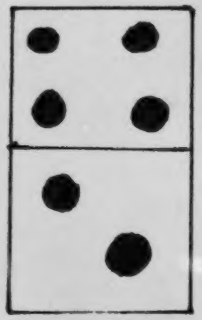


$$\begin{array}{rl} 3 & \text{addend} \\ +\ 2 & \text{addend} \\ \hline 5 & \text{sum} \end{array}$$

2. Use dot cards or dominoes and have students write a number sentence that goes with each card.



$$\begin{array}{r} 2 \\ +\ 3 \\ \hline 5 \end{array}$$



4 + 2 = 6

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add members to make a set to contain specified number of members (limit to 5 members). K-1 *1

ACTIVITIES

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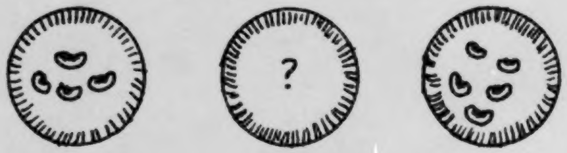
1. Give the children a set of problem cards. The students can use three paper plates placing the number of beans given on the card on two of the plates and deciding how many beans should be placed on the plate which corresponds with the number underneath the flap on the problem card. The students can check their work by lifting the flap to find the answer.

4 + ? = 5

Problem card



2. Write a numeral, such as 5. Create a contest using teams collaborating to write names for that number. The winning team is the one with the most correct names. Allow 2, 3 or even 4 addends.

3. Distribute five or six strips of tagboard to each child. Tell them to write a different addition equation having a sum of 5 or less on each strip. Then have them choose partners. Explain that they are to take turns holding up their equations, with one addend covered, while their partners guess the covered addends.

678

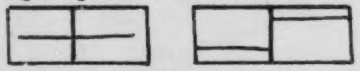
677

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add basic facts (sums 0-12) using concrete objects. 1 *1

ACTIVITIES

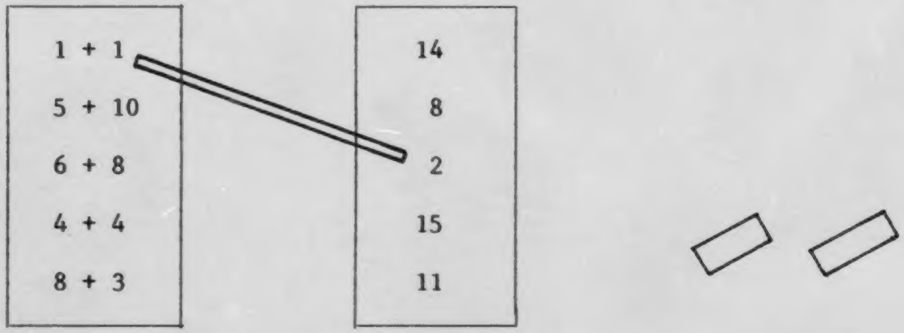
1. Make a set of equation cards. Place the cards in the pocket chart. Place cards with the answers on them face down in a pile. Have the children take turns drawing a card from the pile and matching it with the right problem. Can be made self-checking by coding backs of cards by colored lines.
Example:



2 + 2 = 4 5 + 2 = 7

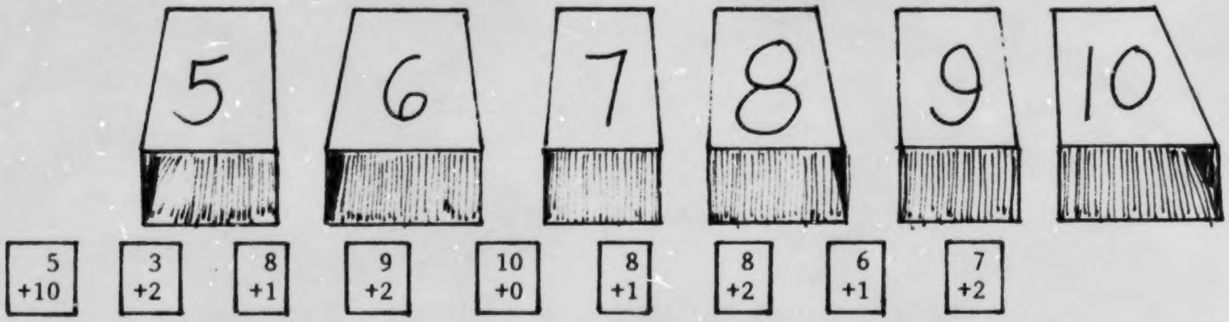
6 + 3 = 9 4 + 5 = 9

2. Make two boards. On one board write problems, on the second board write the answers. Make strips and have the children match the problem to the correct answer. Example:

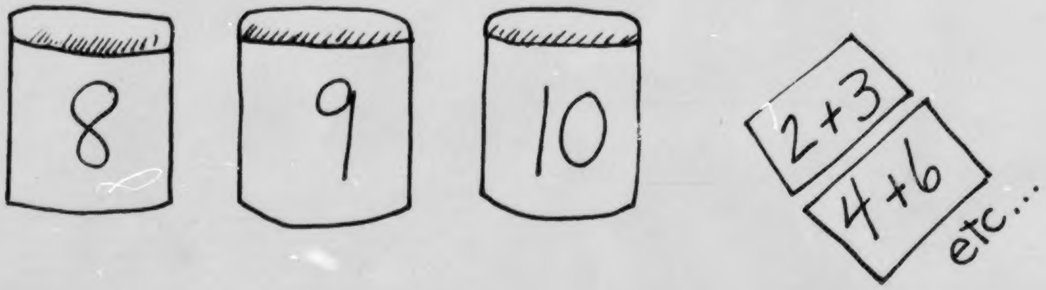


(Variation) Use on chalkboard. Make lines with colored chalk.

3. Cut the tops off quart size milk cartons. Label the cartons 5-10. Make cards with addition problems written on them. Place the cards in a pile and have the children take turns mailing the cards by putting them in the carton labeled with the correct sums.


5
6
7
8
9
10
5 +10
3 +2
8 +1
9 +2
10 +0
8 +1
8 +2
6 +1
7 +2

(Variation) Can be used as a center activity - library pockets and strips, etc.


8
9
10
2+3
4+6
etc...

682

681

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to give basic addition facts (1-10) in rapid response drill, written and orally. 1-2

ACTIVITIES

1. Let the children have a math match. Divide the class into two groups. Line the two groups up on each side of the chalkboard. Have the first child at the beginning of each line come to the chalkboard. Give the pupils a problem. The students write the problem on the chalkboard with the answer. The first child to complete the problem with the correct answer wins the game.

2. Make addition tables similar to the ones below. Cover the tables with contact paper. Have the children write the answers on the table. The student who finishes his table with all the correct answers first wins the game. (Variation - have the children write the problems on a sheet of paper and put the answers.)

Add	5
3	8
5	10
4	9

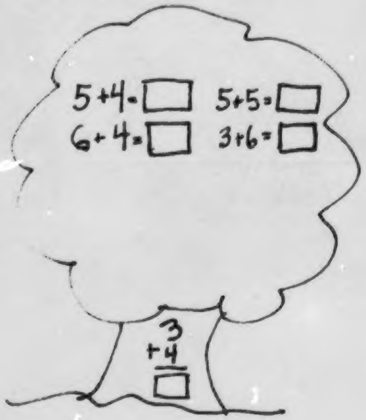
3 + 5 = 8

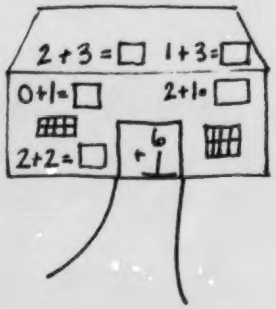
5 + 5 = 10

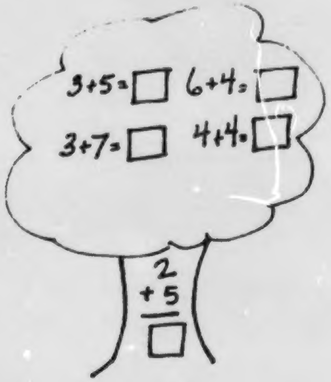
4 + 5 = 9

(Variation) Play Concentration. Duplicate squares with pairs of pictures on the back. Copy the addition (or other) facts on the opposite side. If they can give the correct answer to the problems (2 of them) they can turn over card to see if it matches. The child or team with the most matches wins.

3. Reproduce a picture similar to the one shown below. Give the children a certain time period to complete the task.


5+4=☐ 5+5=☐
6+4=☐ 3+6=☐
3
+4
☐


2+3=☐ 1+3=☐
0+1=☐ 2+1=☐
2+2=☐
6
+1


3+5=☐ 6+4=☐
3+7=☐ 4+4=☐
2
+5
☐

Answers of 8, 9 and 10 - Color Green
Answers of 7 - Color Brown
Answers of 5 and 6 - Color Red
Answers of 0-4 - Color Yellow

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add basic facts:

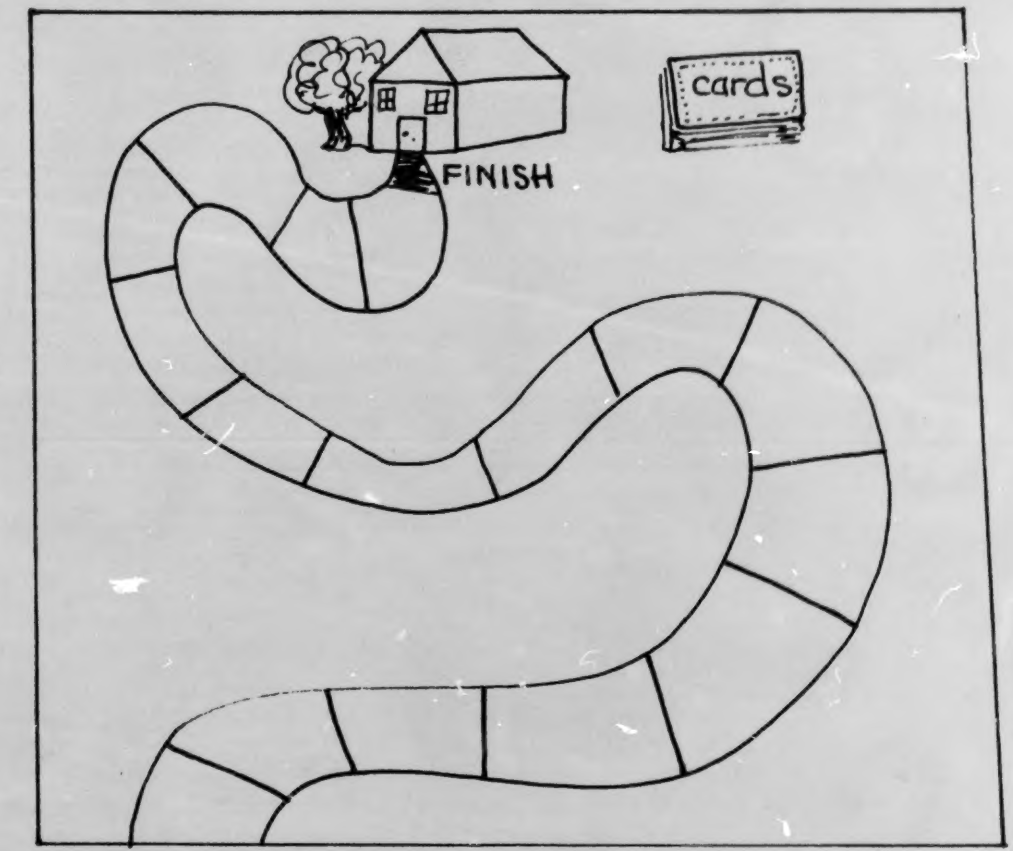
(1) sums (0-10). 1 *1

(2) sums (0-18). 1-2 *2

ACTIVITIES

1. Make a gameboard similar to the one below. Put a stack of cards with problems written on them on the board. Let the children take turns taking a card from the stack. If he can give the correct answer he may roll the dice to determine how many spaces he can move. The first person to get to the house wins the game.

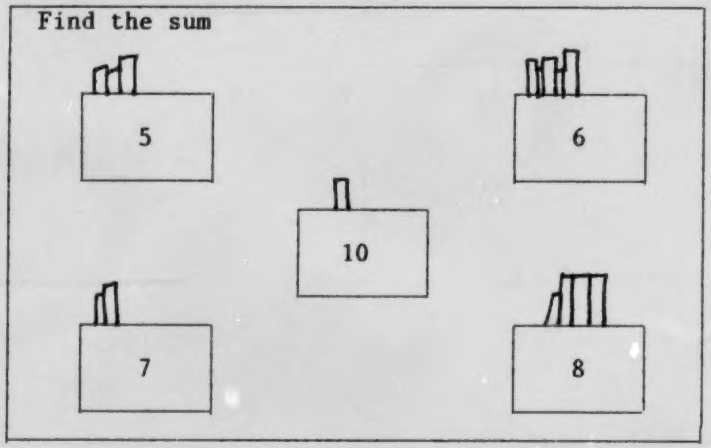
On The Way Home!

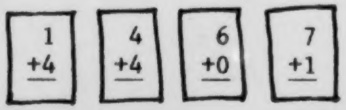


687

688

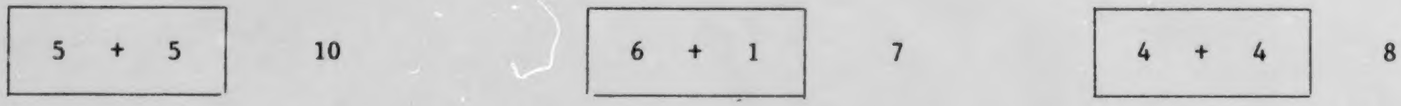
2. Paste five pockets on a sheet of poster board. Write numerals 5-10 on the pockets (could be 10-15, etc.). On cards write addition problems that equal the sums written on the pockets. Have the children place the problems in the correct pocket. The child who finishes the task in the shortest time wins.



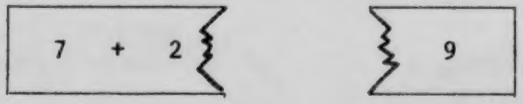


(Variations) Cut-outs for holidays (shamrocks, hearts, etc.).

3. On one set of cards write addition problems and on another set of cards write answers to the problems. Have the children match the answer to the problem.



Make activity self-checking by coding the back of cards or cutting cards to fit as puzzle shapes.



CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add three one-digit numbers (sums 0-9). 1-2 *2

ACTIVITIES

1. Give each child a blank card. Tell them to write any numeral on it from 1 to 5. Call on three children to stand together to hold up their cards. The rest of the group is to silently add the three numbers the children are holding. Call on someone for the sum and to explain how they found it. Then call on three different children to stand together and repeat the activity.

2. Make 45 number cards. $\boxed{1}$ $\boxed{5}$... Turn all of the cards face down. Have the children take turns turning over three cards. If the child can correctly add the three numbers he turns over, he keeps the cards. If he cannot answer them he must turn the cards back.
Example:

	3				
			2		
		6			answer 11

(Variation) Another activity to use: Players: Two
Need: Three beans inside an egg carton that has numbers written in the cups. Pencils and scrap paper.

Players take turns shaking the beans around in the closed egg carton. They open the carton to see which numbers beans fell into, writing down the sum of these numbers. Each player gets 10 turns. They then add up the sums of their 10 throws. The player with the highest score is the winner.

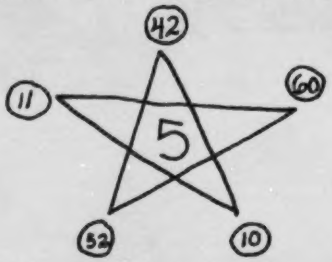
3. Display 10 blocks. Challenge the child to think of various ways to group these objects into 3 groups: for example, two groups with 4 blocks and one group with 2 blocks. Assist the child in writing the addition in horizontal and vertical form that fits each grouping and finding the sum.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add a two-digit number and a one-digit number (no regrouping). 1-2 *2

ACTIVITIES

1. Have the children write five addition exercises adding 5 to each number.



2. Prepare a puzzle similar to the one shown.

a. 1	8	▨	b. 4	6	▨
7	▨	▨	8	▨	▨
▨	d. 2	5	▨	c. 1	6
▨	6	▨	e. 3	8	▨
▨	▨	▨	7	▨	▨

Across	Down
a. 10 + 8	a. 11 + 6

b. 40
+ 6

c. 10
+ 6

d. 20
+ 5

e. 30
+ 8

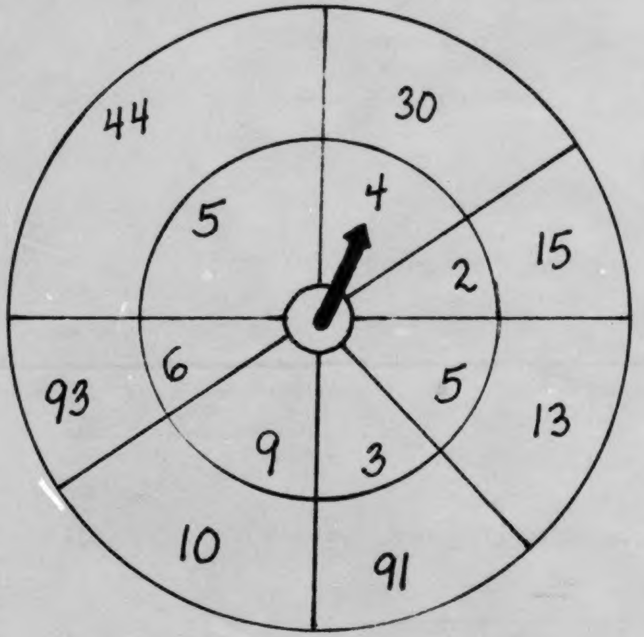
b. 42
+ 6

c. 14
+ 4

d. 26
+ 0

e. 33
+ 4

3. Make several turn wheels similar to the one below. Divide the children into small groups and provide scratch paper. Let the children take turns spinning the wheel. If the child can correctly add the numbers he wins a point. The child with the most points wins the game. Have each child keep his own score.



CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to compute sums to 99 with zero in one of the two addends. 1-3 *3

ACTIVITIES

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1. Play the Bean Bag Game. Make two large diagrams as shown below. Form two teams. A child throws a bean bag onto each diagram. The child writes the numbers on the chalkboard and adds. A correct answer scores one point for the team.

15	34	21
22	38	24
12	25	19

10	20	30
60	0	50
40	10	20

(Variation) Play on chalkboard. Students throw a wet wash cloth that has been made into a ball with rubber bands around it.

2. Make two sets of cards. One set should have problems with zero as one of the two addends. On the second set of cards write the answers for the problems. Have the children play Concentration. A match would be 10 + 0 10 .

3. Dramatize joining no numbers to a set, such as 4 children at a table. Relate 4 + 0 = _____ and have children write the sum. Dramatize joining a set of 5 children to a set of no children. Relate 0 + 5 = _____ and have the children write the sum.

CONTENT: Whole Number Operations

OBJECTIVE: The students will be able to add two-digit numbers (no regrouping). 1-2 *2

ACTIVITIES

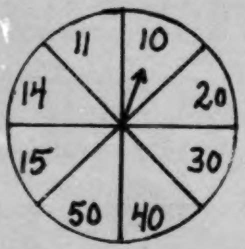
1. Divide the children into two equal teams. Set up bases - home, first, second, third. Home plate should be in front of a chalkboard. The teacher is the pitcher. The players take turns at bat. When players are at bat give them an addition problem involving two two-digit addends without regrouping and sums less than 100. As you call out the problem the child batting should write the problem on the chalkboard with the correct answer. If the sum is incorrect the player is out. Each team gets three outs. If the problem is correct then the player moves to first base and waits to see if the next player answers correctly before moving to second base, etc. The first person to cross home plate wins a point for his team. The team with the most points wins the game. An inning is over after both teams have had a turn at bat - (you may play as many innings as you wish).

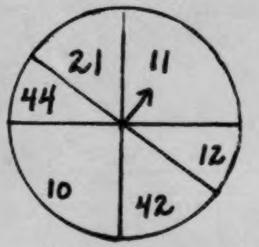
2. Make several tables similar to the ones shown below. Have the children complete the tables. Have the children write the problems and answers on a sheet of paper.

Add	12
10	
81	
16	
42	

Add	20
73	
17	
60	
56	

3. Make two spinners similar to the one shown below. Give the children some scratch paper. Divide the children into two groups. The players take turns spinning the spinners. If the child correctly answers the problem he wins one point for his team. The team with the most points wins.





10 + 11 = 21

CONTENT: Whole Number Operations

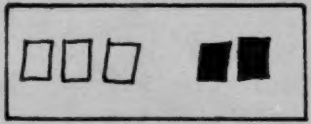
OBJECTIVE: The student will be able to check sums by adding in reverse order. 1-4

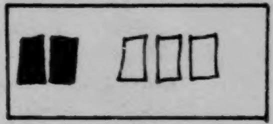
ACTIVITIES

1. Distribute cards numbered 0 through 9 to ten children. Have each child locate the partner whose number, when added to his, will make 9. As each pair of partners identifies itself, have the children write two addition statements on the chalkboard.

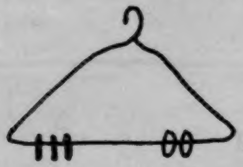
   Example: $\begin{array}{r} 4 \\ +\ 5 \\ \hline \end{array}$ $\begin{array}{r} 5 \\ +\ 4 \\ \hline \end{array}$

2. Provide each child with a sheet of construction paper and squares of two different colors. Direct the children to place two squares of one color on their paper, and beside these place three squares of a different color. Have them write the equation for the model. Have them then turn their papers around and write a new equation. How does the equation they have written for the new arrangement compare to the first one? (The addends are the same but are in a different sequence.)

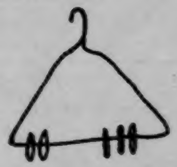




3. Provide each child with a wire coat hanger and some colored clothespins. Use two of one color and three of another. Ask the children to pin the clothespins on the hanger in this manner and write an equation for the model. Now direct the children to rotate the hanger for one-half a turn and have them discuss what happens to the equation.



$3 + 2 = 5$



$2 + 3 = 5$

CONTENT: Whole Number Operations

OBJECTIVE: Given basic addition facts in rapid response drill the students will respond written and orally (1-18).

2-4

ACTIVITIES

1. Play the game Travel. Select one student to be the traveler and one student to flash the cards (addition facts 1-18). The traveler proceeds from student to student as the cards are flashed. If the student in the desk answers first, he/she becomes the traveler. The person who travels the greatest distance wins the game.

2. Prepare basic drill sheets (addition 1-18) and provide a kitchen timer for this activity. Let students time how long it takes for completion. Students will compete with themselves for improved timing.

3. Introduce the basic facts in family groups (twos, threes, etc.). After the students feel they have mastered the facts have an individual conference. Flash the cards allowing 3 seconds for each response. Students chart their response and work for mastery.

(Variation) Whole Class activity
Down the Line
Chalkboard - 2-6 rows of the same numbers in different order 0-9.

6	2	7
5	3	4
3	7	5
4	6	2
7	4	6
2	5	3

Have a student stand in front of each row facing class. Say "Add 6" (or any number). Students turn around and mentally add 6 and write answer beside each number. First finished with correct answer wins. Can be a team game using row or selected groups. Keep score for that group.

Example: Add 4

Team I	Team II	Team III
6-10	2-6	7
5-9	3-7	4
3-7	7-11	5
4-8	6-10	2
7-11	4-8	6
2-6	5-9	3

Can be used for subtraction, multiplication, or division, also.

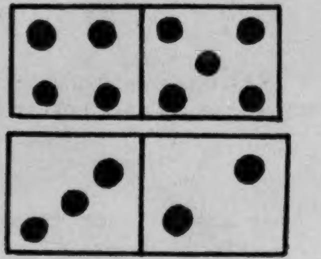
CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add columns of two-digit numbers (no regrouping). 2-3 *3

ACTIVITIES

1. Tell the story of the giant going down the beanstalk. This time he takes 20 steps downward on the limbs and then 3 more, then 30 steps downward on the limbs, and 4 more. Have a student act this out, first taking 23 steps, then 34. Ask, "How many steps does the giant take in all?" Write the addition in a ten and ones chart on the board. Repeat using other numbers.

2. Have the students play dominoes. Place the dominoes face down between two players. Each player takes 2 or 3 dominoes and arranges them one above the other, to represent tens and ones, then writes the sum.



$$\begin{array}{r} 45 \\ +32 \\ \hline 77 \end{array}$$

The players may check each other's work and keep score receiving one point for each correct answer.

3. Divide the students into small groups. Provide each group two paper cups, one containing 23 counters, the other containing 31 counters. Have the students arrange the counters from each cup to show tens and ones, then write the numbers in a tens and ones chart. Then have them find the total number of all the counters, writing the sum in the chart. Repeat with other numbers making sure that the total number of ones and tens does not exceed nine.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add:

(1) a three-digit number and a one-digit number (no regrouping). 2-3 *3
(2) a three-digit number and a two-digit number (no regrouping). 2-3 *3
(3) a three-digit number and a three-digit number (no regrouping). 2-3 *3

ACTIVITIES

1. The tabular arrangement may be used to help students solve these problems.

H	T	O
3	2	4
+		4
3	2	8

H	T	O
3	2	4
+	2	4
3	4	8

H	T	O
3	2	4
+ 3	2	4
6	4	8

2. Stimulating activities similar to the above can be created leaving out some of the digits. Children make up their own problems similar to the following:

$$\begin{array}{r} 306 \\ +\ \ \triangle \\ \hline 309 \end{array} \qquad \begin{array}{r} \triangle 33 \\ +2\triangle 2 \\ \hline 575 \end{array} \qquad \begin{array}{r} 4\triangle 4 \\ +\ 3\triangle \\ \hline 454 \end{array}$$

3. See Activity 1. Use concrete objects such as beans, counters, etc.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add four one-digit numbers. 2-3 *3

ACTIVITIES

1. Have groups of 3, 4, 5, and 2 students come to the front of the class. Remaining students will add to find the total number of students at the front. Write the addition example 3 + 4 + 5 + 2 = 14. Students can find the sum by adding in either order. Group the students differently each time to demonstrate that the order of the addends does not affect the sum.

2. Have students play Elevator. Give pairs of students three sets of digit cards 1-9. On two index cards write $\boxed{\text{up}}$ $\boxed{\text{down}}$. Put the digit cards in one bag and the index cards in another. Students take turns drawing four digit cards and an index card, and placing the digit cards in a column. If "down" is drawn a student groups the top two addends, then adds down.

3. Have students play in pairs. Have each student make the game cards shown below.

2	4	8	0	5	7
1	6	5	6	4	8
3	5	4	9	3	2
+ ☐	+ ☐	+ ☐	+ ☐	+ ☐	+ ☐

Put the digit cards 1-9 in a bag. A player draws a card, writes the numeral in a box on his or her gamecard, then adds. The card is put back in the bag, and the players continue, taking turns. A player must use all digits 1-9, and can use each digit only one time. If a player draws a card with a digit that he or she has drawn before, the player must forfeit that turn. The first player to complete the gamecard wins.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add the following regrouping in the ones place only:

(1) a two-digit number and a one-digit number. 2-3 *3
(2) two two-digit numbers. 2-3 *3
(3) a three-digit number and a one-digit number. 2-3 *3
(4) a three-digit number and a two-digit number. 2-3 *3
(5) two three-digit numbers. 2-3 *3
(6) three two-digit numbers. 2-3 *3

ACTIVITIES

1. Put several exercises similar to the following on the board:

7 tens	2 ones
+	9 ones
__ tens	__ ones

____

Have students tell how they would find each sum. Then have them copy and complete the exercises.

2. Have the children work in groups of two. Give each group a piece of paper and set of numeral cards from 1-49 to be placed in a bag or box.

The first child draws a card and writes the appropriate numerals. For example, if the child draws a card with 37, she then writes on the top line as follows: 3 tens 7 ones. The other child checks to make sure it is correct and then draws to write the top line on his/her paper. Have them follow the procedure to complete the second line.

Find the sum of the numbers in the first exercise and compare the sums. The child with the greater sum receives one point. The child who gets five points is the winner.

3. Give each child between 10 and 20 single sticks and a rubber band. Try not to give the same number of sticks to each child. Instruct the children to count out 10 sticks and bundle them with a rubber band. Ask children to tell how many sticks they have. Then have them take off the rubber band and pass all their sticks to a neighbor. Have the sticks regrouped again and demonstrate how to fill in a table like this:

Tens	Ones
3	7
+2	4

Repeat this activity using numbers from the students until they are comfortable both with regrouping and the way it is recorded.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add two two-digit numbers, regrouping in tens place. 2-4 *4

ACTIVITIES

1. Have student solve puzzles similar to these below:

+			
	36	32	68
	10	7	17
	46	39	85

+			
	16	43	59
	21	3	24
	37	46	?

2. Ask the student to play Tic-Tac-Toe with addition problems similar to the one suggested below. The students can make up the problems or the teacher can make sets of cards and laminate them so that they can be used again. The student must complete the addition correctly before marking the corresponding space.

25 +17 42	38 +13 51	49 +14 63
17 +28 45	22 +29 51	53 +39 92
47 +17	14 +48	23 +39

3. Prepare several sets of cards similar to the examples below. Have the student arrange the cards in order from largest to smallest. The numerals below the sum indicate the order in which the cards would be arranged.

23 +57 80	48 +26 74	39 +57 96	24 +37 61
2	3	1	4

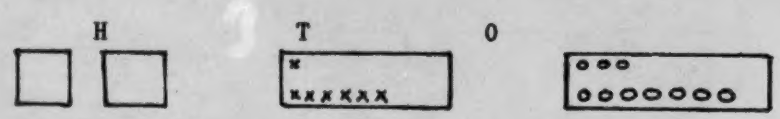
CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add a three-digit number and a two-digit number, regrouping in tens place only. 2-4 *4

ACTIVITIES

1. Given similar problems as the example below let the students use the example to complete other problems.

$$\begin{array}{r} 213 \\ +\ 67 \\ \hline 280 \end{array}$$



H = hundreds T = tens 0 = ones

2. Have the students find the missing digits in problems.

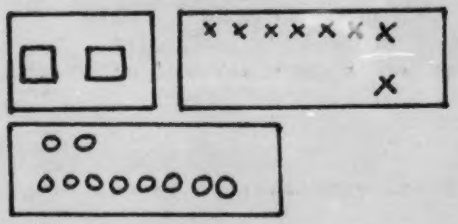
Examples:

$$\begin{array}{rrr} 2 & 5 & \boxed{} \\ & \boxed{} & 8 \\ \hline 2 & 9 & 4 \end{array}$$

3. Have one group of students to draw numeration models and let another group solve the problems.

Example: Each = hundred; X = ten ° = one

Problem:



$$= \begin{array}{rrr} 2 & 7 & 2 \\ & 1 & 8 \\ \hline 2 & 9 & 0 \end{array}$$

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add two three-digit numbers, regrouping in tens place only. 3-4 *4

ACTIVITIES

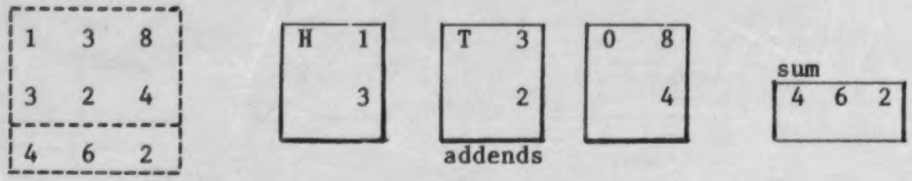
1. After students have been introduced to adding a three-digit number and a two-digit number regrouping in the tens place, have students solve problems with one addend missing in the tens place.
Example:

$$\begin{array}{ccc} 2 & \boxed{} & 7 \\ 3 & 3 & 3 \\ \hline 5 & 9 & 0 \end{array} \qquad \begin{array}{ccc} 3 & 5 & 3 \\ 1 & \boxed{} & 7 \\ \hline 4 & 9 & 0 \end{array}$$

2. On strips of tagboard or blank cards write several three-digit numerals regrouping in tens place only on each card. Cut the cards into puzzle pieces as shown below. Give each player several cards. Place the sums face down, turn one over at a time. Player will try to match addends to the sum shown. The player completing the puzzle wins the game. Mark each strip with a small H, T or O for position.

Example:

$$\begin{array}{r} 138 \\ +324 \\ \hline 462 \end{array} \qquad \begin{array}{r} 162 \\ +419 \\ \hline \end{array} \qquad \begin{array}{r} 527 \\ +146 \\ \hline \end{array}$$



3. Have student solve addition problems or two three-digit numbers by writing the addends and sum in number words.

Example:

$$\begin{array}{cccc} \text{one} & \text{hundred} & \text{twenty} & \text{six} \\ \text{seven} & \text{hundred} & \text{thirty} & \text{nine} \\ \hline \text{nine} & \text{hundred} & \text{sixty} & \text{five} \end{array}$$

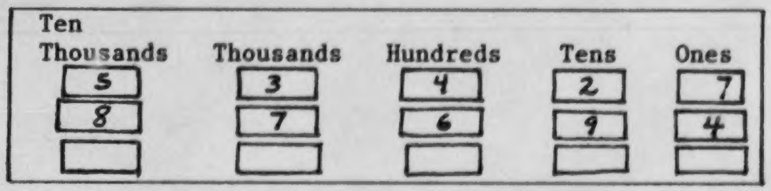
CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add the following with regrouping:

1.	a three-digit number and a two-digit number	2-4	*4
2.	two three-digit numbers	3-5	*5
3.	three three-digit numbers	3-5	*5
4.	two four-digit numbers	3-5	*5
5.	two five-digit numbers	3-5	*5

ACTIVITIES

1. Using a sheet of poster paper, construct a grid for showing the addition of three five-digit numbers or less.

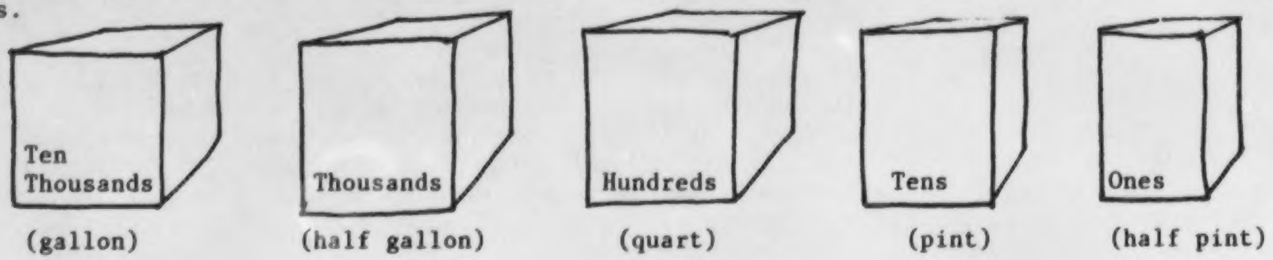


Ten Thousands	Thousands	Hundreds	Tens	Ones
5	3	4	2	7
8	7	6	9	4

Cut out the hole for each digit and tape the grid to the chalkboard so that the numerals can be written in the appropriate place. Record the numbers to be added. Have students add the ones and regroup; then add the tens and regroup. Continue through the ten thousands. Help the students to see that we add and regroup thousands and ten thousands just as we did ones, tens, and hundreds.

2. Play "Regrouping Relay." Divide the class into two teams. One student from each team goes to the board. The students record the numbers to be added and return to their place. When the teacher says "regroup," the next two opponents run to the board and solve the problem. The first person to complete the problem correctly scores a point for his/her team. The students then write the problem for the next pair. Play continues until the original two players solve a problem. The team with the most points wins.

3. Label five milk cartons of assorted sizes from larger to smaller and label from ten thousands to ones.


Ten Thousands
Thousands
Hundreds
Tens
Ones
(gallon)
(half gallon)
(quart)
(pint)
(half pint)

Have students use straws to show the place value of a given number. Then add straws to represent the addition of another number. Show students how to regroup when there are ten or more in a container.

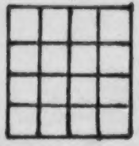
CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to estimate a sum to the appropriate place value. 5-8

ACTIVITIES

1. Play "4 square EST-O" with the students. Have them fold paper to form a 4" x 4" array of boxes. In each box they randomly write the hundreds from 1,000 to 1,900, repeating some. Write an addition problem such as:

$$\begin{array}{r} 935 \\ \underline{+652} \end{array} \qquad \begin{array}{r} 432 \\ \underline{+875} \end{array} \qquad \begin{array}{r} 936 \\ \underline{+721} \end{array} \qquad \begin{array}{r} 872 \\ \underline{+767} \end{array}$$



on the board one at a time for students to estimate. Markers are placed on the correct estimates for the sums. Continue until a student marks 4 boxes in a row, column, or diagonal, and calls EST-O.

2. Provide the students with an assortment of magazines, catalogs or newspapers that include listings of items with their prices. Ask the students to choose several items they would like to buy, round the prices to the appropriate units, tens, or hundreds, and estimate the total cost of the items selected. Then have them calculate the sums to find out how close their estimates were.

3. Have each student write the tens numerals on cards (10, 20... 90). Students take turns writing two-digit numerals on the board. Others hold up the card that shows the nearest ten. Repeat with the nearest hundreds for three-digit numerals.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to add columns of numbers with five or less digits, five or less addends. 6-7 *7

ACTIVITIES

1. Using the examples below work through the steps on the chalkboard letting students supply the information.

Step 1	Step 2	Step 3	Step 4
2693 1832 2638 3	2693 1832 2638 63	2693 1832 2638 163	2693 1832 2638 7163
Add the ones Rename	Add the tens Rename	Add the hundreds Rename	Add Thousands

2. Let the students work in pairs, challenging each other to find the sums of 5-digit addends. Incorporate the challenge into a game of Tic-Tac-Toe. Tell the students each correct sum earns them the right to place an "X" or an "O" in the Tic-Tac-Toe grid. The first student to get three "X's" in a horizontal, vertical or diagonal row wins the game.

726

725

3. For students having difficulty adding more than two numbers, teach them an alternate method of grouping the numbers and adding the sums, or grouping two numbers and adding the third number.

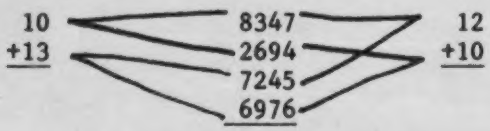
Example:

Add:	**Step 1**		**Step 2**		**Step 3**
8347					
2694	///		///		
7245	8347		7245		11041
6976	2694		6976		14221
	11041	+	14221	=	25262

Or:	**Step 1**	**Step 2**
64,321		/ //
20,671	64,321	84,992
3[illegible],289	20,671	34,289
	84,992	119,281

A variation to this activity would be to also have the students "group by 10's" in adding the sums (mental addition).

Example:



727

728

CONTENT: Whole Number Operations

OBJECTIVE: The student will add whole numbers. 5-8

ACTIVITIES

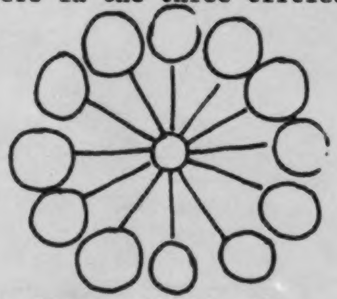
1. Have students find the path to the answer in the bottom box of the puzzles. The path connects some of the numbers in the puzzle. The path must end at the number in the bottom box and the sum of all the numbers in the path must equal the bottom box.

		Start		
6	5	4	5	4
3	6	2	3	2
5	3	1	6	5
4	2	5	4	3
2	1	1	1	6
		32		

		Start		
9	7	5	6	8
8	4	8	5	9
7	8	6	4	5
6	5	7	7	6
5	9	9	8	7
		73		

2. Place the numbers in the circles:

70,000,000; 80,000,000; 90,000,000; 100,000,000; 110,000,000; 120,000,000; 130,000,000; 150,000,000; so that the sum of the numbers in the three circles along each line is 330,000,000.



3. Divide the group into two or four smaller groups. Each student will have a pencil and paper. The leader gives the teams a problem. The first person to answer scores 2 points for his team. Each player on the team who has written the correct answer scores 1 point for his team. The team with the most points wins the game.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to separate a given set of six or less members into two groups and find the number of elements in each set. K

ACTIVITIES

1. Blow up six balloons. Ask, how many balloons? Write 6 on the chalkboard. Have a child break two of the balloons. Ask how many were broken. Write 2. Ask how many balloons are still blown up. Write 4. Have the children say with you, six take away two leaves four.

   Continue this procedure using different subtraction problems of up to 6.

   Materials: Balloons, dice made from milk cartons, pins

2. It is often meaningful to the students if members of the class are used to illustrate a set and the removal of a subset. For example, have three children stand in front of the class. Ask, "Who can describe the set we have formed?" Those seated will probably respond, "It is a set of three children." Tell the rest of the class to close their eyes. Whisper to one of the children standing in front of the room to tiptoe back to his chair. Then have the children open their eyes and tell the number in the set of children now. Discuss what happened to the set of children. (Of the three children in the set, one went back to his desk. How many children do you see?)

   Continue in this way, giving a great deal of practice with sets of one to six objects. It is important that the children understand that when describing the removal of a subset they begin with the members of the set, describe the subset removed, and then count the members in remaining subset. Therefore, try to be consistent in your wording of the statement and question.

3. Bowling is a game of fun and likely will be a popular activity for your children. Use milk cartons as bowling pins and a large ball for a bowling ball.

   Set up six "pins" and have a child take a turn knocking down some of them.

   Have him name the cardinal numbers of the entire set of "pins," those he knocked down, and those that are still standing.

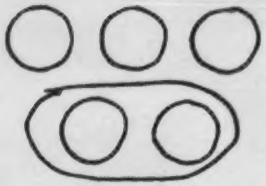
   Materials: Six large milk cartons, large ball

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to identify the parts of a subtraction problem. 1-3 *3

ACTIVITIES

(all levels)



$$\begin{array}{rl} 5 & \text{minuend} \\ -2 & \text{subtrahend} \\ \hline 3 & \text{difference} \end{array}$$

How many are left?

1. Find the missing minuend.

$$\begin{array}{r} \boxed{} \\ -2 \\ \hline 2 \end{array} \qquad \begin{array}{r} \boxed{} \\ -1 \\ \hline 4 \end{array} \qquad \begin{array}{r} \boxed{} \\ -3 \\ \hline 2 \end{array}$$

2. Find the missing subtrahend.

$$\begin{array}{r} 3 \\ -\boxed{} \\ \hline 2 \end{array} \qquad \begin{array}{r} 5 \\ -\boxed{} \\ \hline 1 \end{array} \qquad \begin{array}{r} 3 \\ -\boxed{} \\ \hline 3 \end{array}$$

3. Find the difference.

$$\begin{array}{r} 3 \\ -2 \\ \hline \boxed{} \end{array} \qquad \begin{array}{r} 6 \\ -3 \\ \hline \boxed{} \end{array} \qquad \begin{array}{r} 8 \\ -2 \\ \hline \boxed{} \end{array}$$

734

733

CONTENT: Whole Number Operations

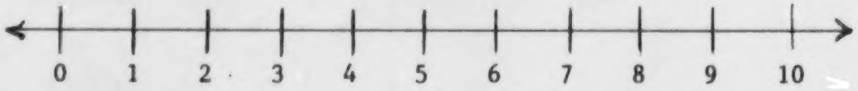
OBJECTIVE: The student will be able to demonstrate a knowledge of subtraction facts with minuends to tens. 1-2 *2

ACTIVITIES

1. Have the students compete in rows in the classroom. Give the first child in each row a ditto with problems. On signal the first student works the first problem and hands the sheet to the person behind him. When the sheet goes all the way to the back of the row and back up to the first person, that row wins provided all the answers are correct. If there are mistakes, give the sheet back and continue the competition while the row checks their answers.

2. At each end of the chalkboard write identical short form exercises. Place A over one set and B over the other. Form two teams, A and B. At a signal the first player of each team goes to that team's exercises, solves the first one, returns to the end of the line, then the next player, and so on. The first team to finish with correct answers wins the game.

3. Make number lines for the children. Give problems which they solve by using their fingers to make the moves rather than writing on the number line.



3 - 2 =

5 - 1 =

6 - 0 =

10 - 9 =

7 - 3 =

4 - 1 =

Suggestion could replace Activity 1. A very good game, or added as a fourth activity.

735 736

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to subtract a one-digit number from a two-digit number (numerals to 18). 1-3 *3

ACTIVITIES

1. Give each child 18 counters and a cube labeled with numbers 1-5. Let children play in pairs. Each child makes a train of 18 counters. The players take turns rolling the cube. They subtract the number they roll, then write the corresponding equation on paper. The first child to reach zero is the winner. For example, if the child rolled 4, he would remove 4 counters from the train and write 18-4=14 on paper.

2. Play the game "Fooled You." Present subtraction problems with right and wrong answers. The child is to cross out each incorrect answer. Then have him write the correct answer below.

3. Give each child some counters and a strip of construction paper divided into 14 spaces. The children cover all the spaces with the counters. A child writes a numeral on the board. The children subtract that number of spaces from their paper. The first one who determines how many remain gets to call out the next number to be subtracted. As the children work the problems have them write the equations and answers on the paper or on the chalkboard. For example: The child calls out 5 - the children remove 5 counters from their paper and tell how many are left. Then write 14-5=9.

CONTENT: Whole Number Operations

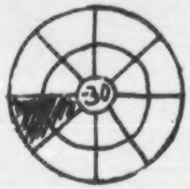
OBJECTIVE: The student will be able to compute differences to 99 with a zero in the subtrahend. 1-3 *3

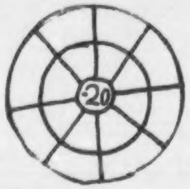
ACTIVITIES

1. On one set of cards write subtraction problems with a zero in the subtrahend. On another set of cards write the answers to the problems. Have the children match the answer to the problem. Make self-checking by color coding or cutting jagged pieces.

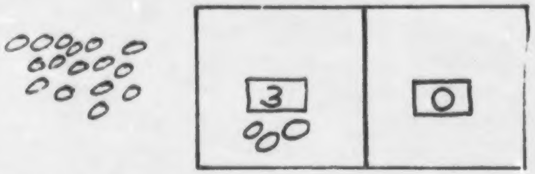
55 - 10 =	45	42 - 20 =	22	12 - 0 =	12

2. Give children a practice wheel similar to the one shown below. Have the children fill in their correct answer in the empty space. For example, 70 - 30 = 40. Write the problem and answers and then erase their answers from the practice wheel with a dry cloth.





3. Give the children a set of number cards for numerals 0-9, a large sheet of paper divided in half and some counters. Have the children put the card on the right half of the paper. Then the child picks a number card to put on the left side of the paper. For example:



3 - 0 = 3

Have the child put the proper number of counters on the paper. Then have the child write the correct equation and answer.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to subtract a one-digit number from a two-digit number (no regrouping); subtract a two-digit number from a two-digit number (no regrouping).

1-2 *2

ACTIVITIES

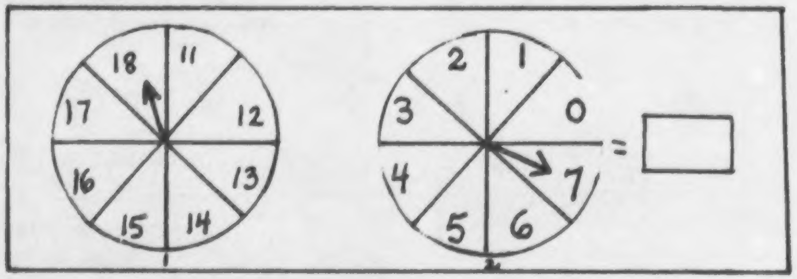
1. Glue a magazine picture to a piece of tagboard. Cut the picture into approximately 15 different-size rectangles. On the back of each rectangle write a subtraction problem involving two-digit addends that are multiples of ten and do not require regrouping. On a second sheet of tagboard, reassemble the picture, then trace around each rectangle. Write the answer for each problem in its corresponding space. Mix up the rectangles. Have the children match the problem on the back of each rectangle with the space containing the correct answer.

2.

--	18	19	99	28	29	48	59	88
6						42		
3								
7			92					
4								
2								86
8								
1	17							
5							54	

Have the children subtract each number in the column at the left from each numeral in the top row.

3. Make subtraction practice wheels as shown below. Have the children spin wheel one, write the numerals, then spin wheel two and subtract that number from the first. Have the children write the problems and answers on paper.



742

741

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to check subtraction by using addition. 1-4 *4

ACTIVITIES

1. Show the student how to check subtraction without writing a separate addition problem. Show the children how to add from the bottom up (the difference and the subtraction) to get the sum or minuend.

$\underline{9\ 3\ 9}$ sum or minuend

Example:

$$\begin{array}{rl} 9\ 3\ 9 & \\ \underline{-1\ 6\ 2} & \leftarrow_{+} \\ 7\ 7\ 7 & \uparrow\leftarrow \end{array}$$

2. Name a three-digit number. Have the student write three different subtraction problems having a difference of the number named.

3. Write a three-digit number such as 725 on the chalkboard. Ask the student to subtract another three-digit number and name the difference. Then have a student add the number subtracted to the difference and give the sum.

Example:

$$\begin{array}{r} 8\ 6\ 2 \\ \underline{-2\ 3\ 0} \\ 6\ 3\ 2 \end{array} \qquad \begin{array}{r} 2\ 3\ 0 \\ \underline{+6\ 3\ 2} \\ 8\ 6\ 2 \end{array}$$

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to identify addition and subtraction as inverse operations. 1-4

ACTIVITIES

1. Divide the class into two teams. Have a member from each team go to the chalkboard to solve an addition or subtraction problem which you provide. As soon as he finishes the problem he sits down and the next person on his team goes to the board and checks the solution by performing the opposite operation. If he finds no error and does the check correctly his team receives 3 points. If he finds an error and corrects it his team gets 2 points. If he does the check incorrectly on a correctly solved problem, his team receives 1 point. The team with the most points after an indicated period of time wins.

2. Give the pupils several sheets of paper with sets of three numerals each such as 18, 4, and 22 written on them. Have them write the facts for this number family in four ways, for example, 18 + 4 = 22, 4 + 18 = 22, 22 - 18 = 4. Start with simple combinations and then work up to more difficult examples such as: (a) 207, 689, 896; (b) 150, 98, 248.

3. Select 3 girls and 2 boys to stand next to each other. Ask the class to make up an addition statement to represent this arrangement (3 + 2 = 5 or 2 + 3 = 5). Next have the boys sit down. What statement describes this? (5 - 2 = 3) Now have the boys return to the group and ask the girls to sit down (5 - 3 = 2).

CONTENT: Whole Number Operations

OBJECTIVE: The student will recall basic subtraction facts in rapid response drill, written and oral (minuends to 18). 3-5

ACTIVITIES

1. Play the game "Travel." Select one student to be the traveler and one student to flash the cards. The traveler proceeds from student to student as the cards are flashed. If the student in the desk answers first, he/she becomes the traveler. The person who travels the greatest distance wins the game.

2. Prepare basic drill sheets (minuends to 18) and provide a kitchen timer for this activity. Let students time how long it takes to complete sheets. On following days they will compete with themselves for improved timing.

3. Introduce the basic facts in family groups (twos, threes). After students feel they have mastered the facts, have individual conferences. Flash the cards, allowing 3 seconds for each response. Students chart their response and work for mastery.

CONTENT: Whole Numbers Operations

OBJECTIVE: The student will be able to subtract:

1. A one-digit number from a three-digit number (no regrouping) 1-2 *2
2. A two-digit number from a three-digit number (no regrouping) 1-2 *2
3. A three-digit number from a three-digit number (no regrouping) 1-2 *2

ACTIVITIES

1. The tabular arrangement may be used to help students solve these problems:

	H	T	O
	2	4	7
-			3
	2	4	4

	H	T	O
	1	5	6
-		2	6
	1	3	0

	H	T	O
	2	7	9
-	1	2	3
	1	5	6

2. Enrichment activities may be provided such as these:

$$\begin{array}{rrrr} & 3 & 2 & \triangle \\ - & & & 4 \\ \hline & 3 & 2 & 3 \end{array} \qquad \begin{array}{rrrr} & 5 & \triangle & 6 \\ - & & 2 & \triangle \\ \hline & 5 & 7 & 2 \end{array} \qquad \begin{array}{rrrr} & \triangle & 3 & 6 \\ - & 1 & \triangle & 4 \\ \hline & 6 & 3 & 2 \end{array}$$

3. See Activity 1. Provide concrete objects such as beans or counters for the students.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to subtract the following with regrouping:
(1) a one-digit number from a two-digit number. 2-3 *3
(2) A two-digit number from a two-digit number. 2-3 *3

ACTIVITIES

1. Put several exercises similar to the following on the board:

    7 tens 2 ones
    - 9 ones
    ___ tens ___ ones

    Have students tell how they would find the answer. Have them copy and complete several similar problems.

2. Have students work in groups of two. Give each group a piece of paper and a set of numeral cards 1-50 to be placed in a bag or box.

    The first child draws a card and writes the appropriate numerals. For example, if the child draws a card with 27 he writes on the paper as follows: 2 tens and 7 ones. The other child checks the writing and then draws for his number. Have them follow this procedure in drawing a second number, making sure you remind them that the greater number should be written on the top.

    They subtract to find the answer and the child with the greatest number gets one point. The game is over when the score is five.

3. Give students 25 sticks and rubber bands. Have them group the sticks in sets of 10. On large sheets of poster paper have the following:

    tens ones
    _____ _____
    - _____
    ____

    Have them regroup in a similar way using other problems until they demonstrate an understanding of regrouping.

751 752

CONTENT: Whole Number Operations

OBJECTIVE:

1. The student will be able to subtract a one-digit number from a three-digit number. (Regrouping ones) 3-5 *5
2. The student will be able to subtract a two-digit number from a three-digit number. (Regrouping ones) 3-5 *5
3. The student will be able to subtract a three-digit number from a three-digit number. (Regrouping ones) 3-5 *5
4. The student will be able to subtract a one-digit number from a four-digit number. (Regrouping ones) 3-5 *5

ACTIVITIES

1. Have student solve problems with missing digits. The problems can be written by a group of students or the teacher.

Example:

$$\begin{array}{rrrrr} & 9 & 7 & \triangle & 3 \\ - & & & 8 & 9 \\ \hline & 9 & \square & 8 & 4 \end{array}$$

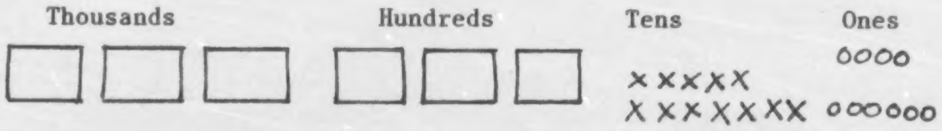
2. Given the minuend and the difference in subtraction problems have student find the subtrahend.

Example:

$$\begin{array}{rrrr} 6 & 2 & 6 & 5 \\ & & \triangle & \triangle \\ \hline 6 & 1 & 8 & 7 \end{array} \quad = \quad \begin{array}{rrrr} 6 & 2 & 6 & 5 \\ & & \overset{7}{\triangle} & \overset{8}{\triangle} \\ \hline 6 & 1 & 8 & 7 \end{array}$$

3. Have student write subtraction problems for given numeration models.

Example:



$$\begin{array}{r} 3254 \\ -\quad 76 \\ \hline \end{array}$$

CONTENT: Whole Number Operations

OBJECTIVE: The student will subtract the following with regrouping in all places:

(1) a one-digit number from a three-digit number. 3-5 *5
(2) a two-digit number from a three-digit number. 3-5 *5
(3) a two-digit number a from four-digit number. 3-5 *5
(4) a three-digit number from a four-digit number. 3-5 *5
(5) a four-digit number from four- and five-digit numbers. 3-6
(6) a three-digit number from a three-digit number. 3-5 *5

ACTIVITIES

1. To assist the student in regrouping, construct a set of 4" x 6" cards showing only the number of ten thousands and thousands.

Ten Thousands	Thousands
5	3

Ten Thousands	Thousands
8	7

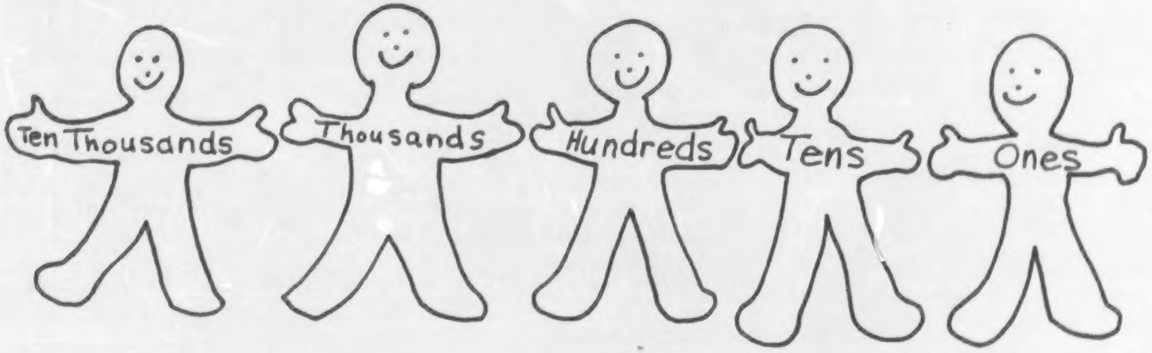
Laminate the cards so that they may be reused and students can write directly on them. Have the students regroup to show one fewer ten-thousand and ten more thousands. Help the student to see that regrouping ten thousands to thousands is like regrouping tens to ones.

Ten Thousands	Thousands
4 ~~5~~	13 ~~3~~

Ten Thousands	Thousands
7 ~~8~~	17 ~~7~~

2. Have each student write any four- or five-digit numeral on separate cards. Working in pairs, each student stacks his or her cards face down. They then turn over the top card. Both use the two numerals to write a subtraction problem. Students complete the problem and compare answers. If answers are not the same, students find and correct errors. Repeat with the remaining numerals.

3. Construct 5 place value men from large poster paper. Label them ones, tens, hundreds, thousands, and ten thousands.



Give students a subtraction problem. Attach clothespins to the hands to illustrate the given minuend; for example, 64, 214 would be illustrated as shown above. Then have students subtract the subtrahend, starting with ones, tens, etc. Have a student who understands the regrouping process serve as sergeant of regrouping. When regrouping is necessary and there are not sufficient clothespins on a man to subtract a given numeral, the student must go to the sergeant of regrouping and exchange one 10 for 10 ones, etc. He continues the problem--subtracting and regrouping where necessary.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to subtract one number from another, minuends to 5 digits.

5-7 *7

ACTIVITIES

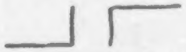
1. Either duplicate the following chart or write it on the chalkboard.

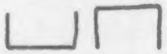
602	400	327
719	903	501
890	345	167

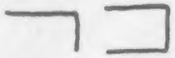
Answers

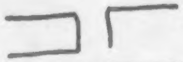
a.	435	f.	576
b.	55	g.	156
c.	171	h.	18
d.	552	i.	184
e.	233	j.	257

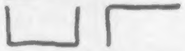
Using the code, students are to find the two numbers and subtract the smaller from the larger.

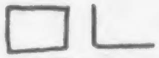
a.) 

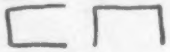
b.) 

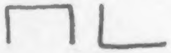
c.) 

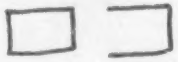
d.) 

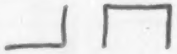
e.) 

f.) 

g.) 

h.) 

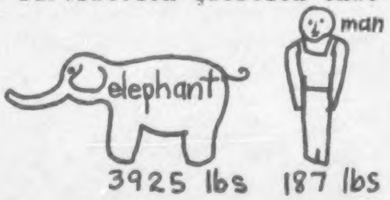
i.) 

j.) 

2. Have the students work problems such as the following:

D & R Company had $10,000 to spend on equipment. They spent $2,450 on furniture, $549 on office supplies, $2,785 on machinery and $942 on repairs. How much was left after these expenses?

3. Cut out pairs of pictures from magazines. Work an appropriate number under each picture. On a task card ask a subtraction question that the student must work.



How much more does the elephant weigh?

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to use repeated addition to show the relationship of addition and multiplication. 3-5

ACTIVITIES

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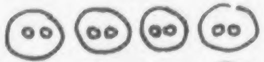
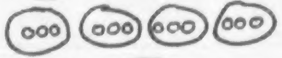
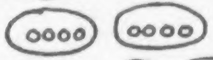
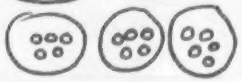
1. Have each student hold up three fingers of each hand. Then show the student that this can be illustrated by writing 2 x 3. Write 2 x 3 = 6 on the chalkboard or chart.

2. Have students fold a page into fourths. Ask the students to illustrate one of the following additions on each fourth with counters and then write the multiplication sentence that goes with the addition.

Given	Do This	
2 + 2 + 2 + 2		4 x 2
3 + 3 + 3 + 3		4 x 3
4 + 4		2 x 4
5 + 5 + 5		3 x 5

3. Ask two groups of children with four children in each group to stand on either side of the room. Ask, "How many groups of children are there? (2) How many in each group? (4) How many in all? (8)" Have the children write the addition sentence that goes with joining the groups: 4+4=8. "How many fours are added? (2) Two fours are equal to what number? (8) Explain that 2 fours may be shown by a multiplication sentence. Write 2 x 4 = 8.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to identify the parts of a multiplication problem. 3-4 *4

ACTIVITIES

1. After the students have been introduced to multiplication, use an illustration similar to the following:

   (Caption) The numbers that you multiply are called factors.

   Example: 8 x 7 = 56

8	x	7	=	56
factor		factor		product

   $$\begin{array}{rl} 7 & \text{factor} \\ \underline{\times 8} & \text{factor} \\ 56 & \text{product} \end{array}$$

2. Use same activity suggested for number 1 above.

3. Have students form a group of five boys and a group of five girls. Have the students tell how many groups of children there are, how many are in each group, and how many there are in all. Have the children write the multiplication sentence (2 x 5 = 10). Point out that 2 and 5 are called factors and 10 is called the product.

763

764

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to:

(1) Multiply two one-digit numbers (products to 36). 3 *3

(2) Multiply two one-digit numbers (products through 81). 3-4 *4

ACTIVITIES

1. Use flashcards to help the students memorize the basic facts. Divide the class (or group) into two teams. Show a flashcard to each child in turn. If the correct product is named within a given time limit give the card to the child. The team with the most cards wins.

2. Have students complete tables such as the following within a given time limit. Do this type of drill several times a week. Keep a record of each child's score and at the end of the week compute the average for each child and announce the winner(s) for the week.

Example: Complete each table.

Multiply by 5

0	
1	
2	
3	
4	
5	
6	
7	
8	
9	

Multiply by 6

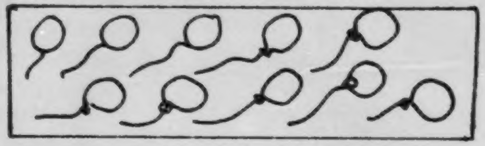
0	
1	
2	
3	
4	
5	
6	
7	
8	
9	

Multiply by 7

0	
1	
2	
3	
4	
5	
6	
7	
8	
9	

3. Arrange on flashcards patterns illustrating the multiplication facts being taught. Flash the cards one at a time giving the student a few seconds to respond.

Example:



2 x 5 = 10

766

765

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to multiply a two- or three-digit number by a one-digit number (no regrouping). 3-4 *4

ACTIVITIES

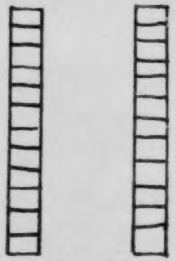
1. Write on the chalkboard 2 x 24. Let the student use objects to find the product. Relate the discussion to the basic facts discussed earlier.

Example:

$$\begin{array}{r} 24 \\ \times\ 2 \\ \hline 8 \end{array} \quad \text{and} \quad \begin{array}{r} 24 \\ \times\ 2 \\ \hline 48 \end{array}$$

2. Using a transparency with an overhead projects, draw several arrays. Have the students state the problem and give the product.

Example:

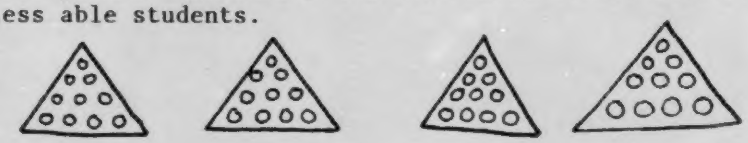


2×12

$$\begin{array}{r} 12 \\ \times 2 \\ \hline \end{array}$$

3. Using counting blocks or bottle caps and yarn, arrange blocks in groups of ten. Circle each group of ten with yarn to illustrate 4 x 10. Let the more able students develop examples to be illustrated by the less able students.

Example:



$$\begin{array}{r} 10 \\ \times 4 \\ \hline 40 \end{array}$$

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to:
(1) multiply a two-digit number by a one-digit number with no digit greater than 6. 3-4 *4
(2) multiply a two-digit number by a one-digit number. 4-5 *5

ACTIVITIES

1. Have each student lay out 4 sets of 16 blocks. Write on chalkboard the following example:

	T	O
	1	6
x		4

Ask how many single blocks in all. Have students regroup as much as possible into bars of ten (2 bars of ten and 4 single ones). Record:

	T	O
	2_1	6
x		4
		4

How many bars of ten in all? Record.

	T	O
	1^2	6
x		4
	6	4

Repeat with several examples.

2. Use the following illustration to help students regroup when multiplying a two-digit number by a one-digit number.

Multiply

$$\begin{array}{r} 87 \\ \underline{\times\ 2} \\ 14 \end{array} \quad \boxed{2 \times 7}$$

Multiply

$$\begin{array}{r} 87 \\ \underline{2} \\ 14 \\ 160 \end{array} \quad \begin{array}{l} \boxed{2 \times 7} \\ 2 \times 80 \end{array}$$

Add

$$\begin{array}{r} 87 \\ \underline{2} \\ 14 \\ \underline{160} \\ 174 \end{array}$$

3. Use the following example to help students multiply tens and ones with regrouping.

3 x 24

Step 1. Multiply ones. 3 x 4 = 12

$$\begin{array}{rr} 2 & \boxed{4} \\ \times & \boxed{3} \\ \hline & 2 \end{array}$$

Step 2. Rename. 12 = 1 ten + 2

Step 3. Multiply tens. 3 x 2 tens = 6 tens

$$\begin{array}{rr} \boxed{{}^{1}2} & 4 \\ \times & \boxed{3} \\ \hline 7 & 2 \end{array}$$

Step 4. Add. 6 tens + 1 ten = 7 tens

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to check multiplication by reversing factors and re-multiplying. 3-8

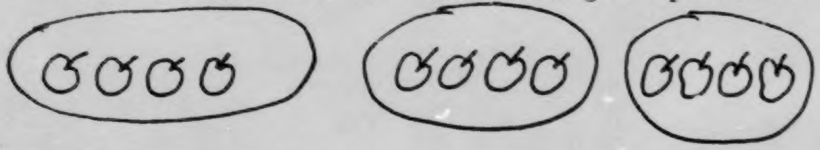
ACTIVITIES

1. Display a card on flannelboard, showing two rows of four figures each. Ask how many rows, how many in each row, and how many in all. Guide the children to write 2 x 4 = 8. Rotate the cards on the flannel board 90 degrees. Write 4 x 2 = 8; ask if changing the order of the factors changes the product.

2. Have students supply the missing number in problems similar to these.
Example:

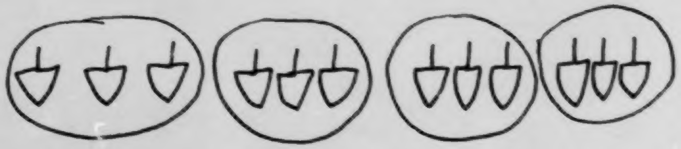
2 x 6 = 12	6 x 2 = _____
2 x 0 = 0	0 x 2 = _____
1 x 9 = _____	9 x 1 = 9
3 x 7 = 21	7 x 3 = _____
2 x 9 = 18	9 x 2 = _____
2 x 7 = _____	7 x 2 = 14
4 x 5 = 20	5 x 4 = 20
8 x 0 = 0	0 x 8 = _____

3. Have students write the factors for given patterns:



3 x 4 = 12

factor factor product



4 x 3 = 12

factor x factor = product

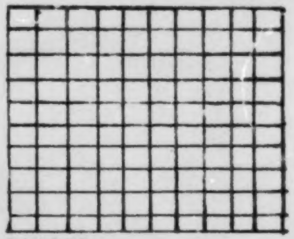
CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to multiply two or three digit numbers by 10, 100, and their multiples. 4-7

ACTIVITIES

1. Make ten-strips and hundred-square to use in demonstrating multiplication by tens and one hundreds.

10 strip



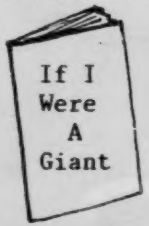
100 square

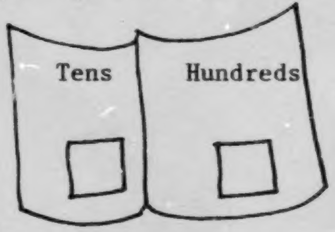
Have students demonstrate and record patterns like the following:

2 x 20 = 40	12 x 20 = 240
2 x 100 = 200	12 x 200 = 2400

Help students to arrive at the generalization that in multiplying tens there is 1 zero in the product and in multiplying hundreds there are 2 zeros in the product. To multiply a number by 10, write that number followed by 1 zero. To multiply a number by 100, write that number followed by 2 zeros. To multiply by multiples of 10, put a zero in the ones place and multiply by the tens digit. To multiply by multiples of 100, put two zeros and multiply by the hundreds digit.

2. Construct a manila folder like the sample below to be used for independent practice on multiplying by 10's, 100's. Call the folder "If I Were a Giant." Students are to pretend that they are in giant land where everything is 10 times or 100 times larger.

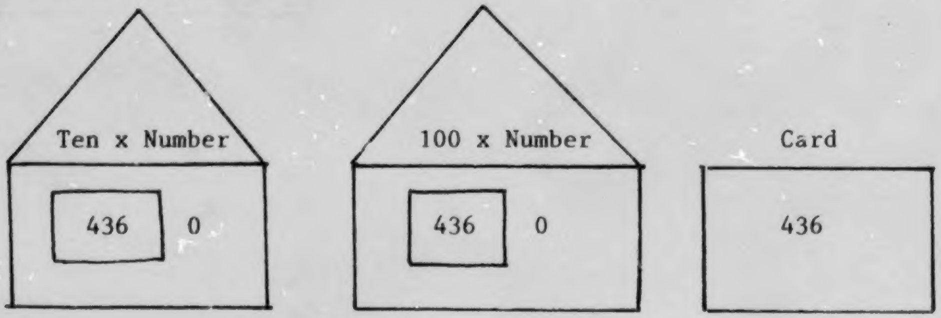




10 x 62	100 x 45
20 x 62	200 x 45
30 x 62	300 x 45
40 x 62	400 x 45

Inside the folders are pockets containing numerals on 3" x 5" cards. Students see how quickly they can multiply each by multiples of tens and hundreds. A student may race against himself or another student. Correct answers are on the back of each card for self-checking.

3. Introduce the process of multiplying by 10 and 100 using the 100 squares and 10 strips mentioned above. Follow up by giving the students "instant multipliers." Use small white envelopes for "instant multipliers."



Have a set of cards made to fit inside the envelopes. Write two and three digit numbers on each card so that they will show through the windows and match with the zero and the double zeros. The result is the product of the number times 10 and 100 respectively.

CONTENT: Whole Number Operations

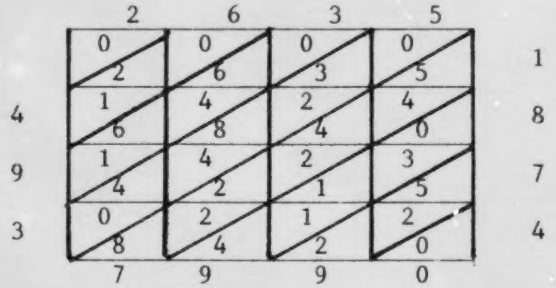
OBJECTIVE: The student will be able to:

(1) multiply a three-digit number by a one-digit number. 4-5 *5
(2) multiply a two-digit number by a two-digit number. 5-6 *6
(3) multiply a three-digit number by a two-digit number. 5-6 *6
(4) multiply a three-digit number by a three-digit number. 5-7 *7
(5) multiply a four-digit number by any number of four digits or less. 6-8 *8

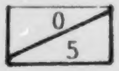
ACTIVITIES

1. Show the students how to do lattice multiplication to vary procedures. To make a lattice, separate a rectangular region into square regions with a lower left to upper right diagonal drawn in each square. Write one factor along the top of the lattice and the other along the right.
Example:

$$\begin{array}{r} 2635 \\ \underline{\times\ 1874} \\ 10540 \\ 184450 \\ 2108000 \\ \underline{2635000} \\ 4{,}937{,}990 \end{array}$$



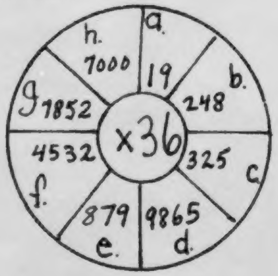
5 x 1 =



no tens
five ones

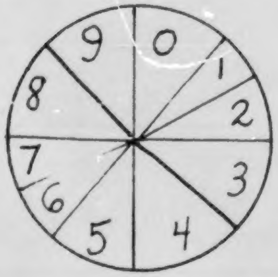
Numerals on bottom and left are found by adding the diagonals, carrying when necessary. The answer is 4,937,990.

2. Have the students find the missing information.

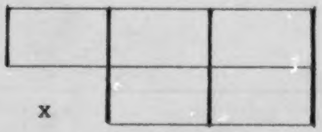


a. 684
b. 8928
c. 11,700
d. 355,140
e. 31,644
f. 163,152
g. 282,672
h. 252,000

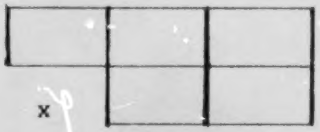
3. Use stiff paper, a pencil and a paper clip to make a spinner.



Draw a multiplication grid for each play. Level of difficulty will depend on the student.



Player I



Player II

The players take turns spinning the spinner. After each spin, the players write the numeral shown by the spinner in one of the boxes of their grid. After enough spins to fill the boxes, the players find the products of the numbers on their grids. The winner is the player who has the greatest product or the first to find the correct product.

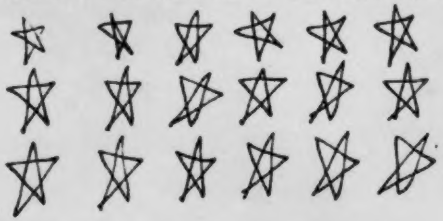
CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to check multiplication by division. 5-8

ACTIVITIES

1. Use flannelboard cut-outs to illustrate the inverse relationship between the basic multiplication and division facts.

   Example:



3 sixes = 18 so 3 sixes are in 18

3 x 6 = 18 $\begin{array}{r}3\\ \times 6\\ \hline 18\end{array}$ 18 ÷ 6 = 3 $\begin{array}{r}3\\ 6\overline{)18}\end{array}$

6 threes = 18 6 threes are in 18

6 x 3 = 18 18 ÷ 3 = 6

Therefore, we can check multiplication by dividing the product by one of the factors. The same procedure works with larger numbers:

34 x 4 = 136 $\begin{array}{r}34\\ \times 4\\ \hline 136\end{array}$ 136 ÷ 4 = 34 $\begin{array}{r}34\\ 4\overline{)136}\end{array}$

2. Provide students with only two numbers - a product and one factor. Ask students to identify the missing factor and write related multiplication and division sentences.

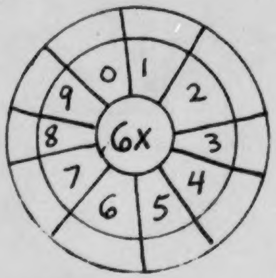
   Example:

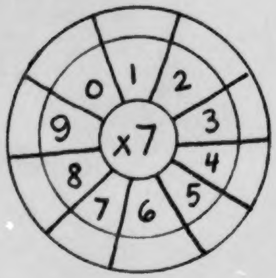
15,240

$15 \times \boxed{16} = 240$ $240 \div 15 = \boxed{16}$

$\boxed{16} \times 15 = 240$ $240 \div \boxed{16} = 15$

3. Give the students multiplication wheels like the following to complete:





Have the students use concrete objects to find the products. Verbalize the results: 7 times ? = 21. Then, have the students show and verbalize the related division fact:

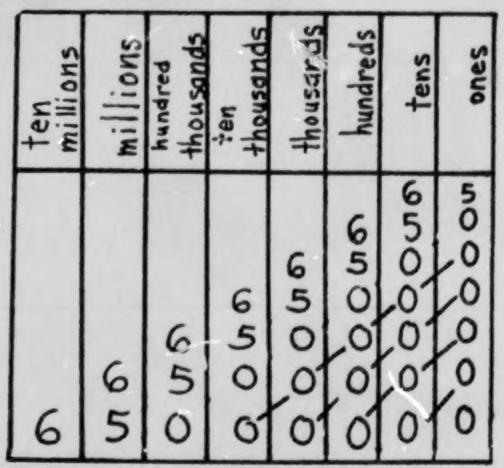
7 times 3 = 21 so 21 divided by 3 = 7

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to multiply by powers of 10:
(1) by 10; 100; 1,000. 5-6 *6
(2) by 10,000; 100,000; 1,000,000. 6-8 *8

ACTIVITIES

1. Discuss the following chart with the students.



ten millions	millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones
						6	5
					6	5	0
				6	5	0	0
			6	5	0	0	0
		6	5	0	0	0	0
	6	5	0	0	0	0	0
6	5	0	0	0	0	0	0

Your students can probably conclude from studying the chart that when a zero is annexed the new numeral represents a number that is 10 times as great.

Have the students complete a chart like the following:

X	10	100	1,000	10,000	100,000	1,000,000
7	70	700	7,000	70,000	700,000	7,000,000
15	150	1,500	15,000	150,000	1,500,000	15,000,000
95	950	9,500	95,000	950,000	9,500,000	95,000,000
123	1,230	12,300	123,000	1,230,000	12,300,000	123,000,000
87	870	8,700	87,000	870,000	8,700,000	87,000,000
479	4,790	47,900	479,000	4,790,000	47,900,000	479,000,000
984	9,840	98,400	984,000	9,840,000	98,400,000	984,000,000
69	690	6,900	69,000	690,000	6,900,000	69,000,000

Tell how many zeros you write to the right of a numeral when you multiply by:

10 _____ 10,000 _____ 1,000,000 _____

1,000 _____ 100 _____ 100,000 _____

2. Have the students examine this table.

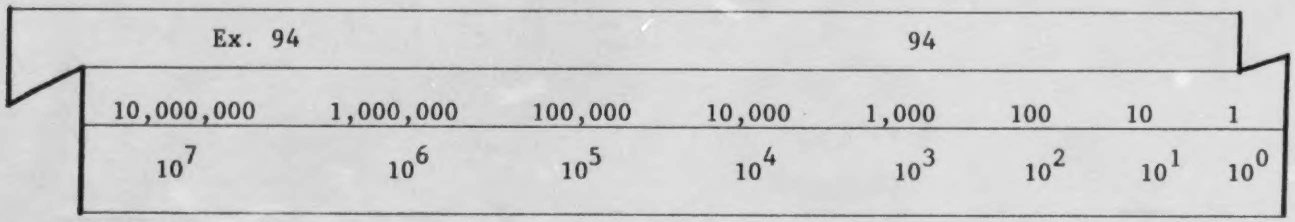
Multiply	Meaning	Product	Product
$10^2 \times 10^1$	(10x10) x 10	10^3	1,000
$10^2 \times 10^2$	(10x10) x (10x10)	10^4	10,000
$10^2 \times 10^3$	(10x10) x (10x10x10)	10^5	100,000
$10^2 \times 10^4$	(10x10) x (10x10x10x10)	10^6	1,000,000
$10^2 \times 10^5$	(10x10) x (10x10x10x10x10)	10^7	10,000,000
$10^3 \times 10^4$	(10x10x10) x (10x10x10x10)	10^7	10,000,000

Have students write the products for such problems as:

$10^4 \times 10^3 =$ $10^3 \times 10^5 =$ $10^1 \times 10^7 =$ $10^3 \times 10^9 =$

$10^7 \times 10^6 =$ $10^8 \times 10^5 =$ $10^3 \times (10^5 \times 10^6) =$ $(10^3 \times 10^5) \times 10^7 =$

3.



Fold and mark a piece of tagboard as shown. Make several cards containing different numerals such as 94 to slide along the crease. Have students write the numerals shown as the numeral card is moved to different positions. (Example: 94,000,000 - - - - - - - - - - - 9400)

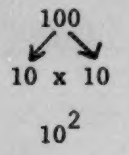
CONTENT: Whole Number Operations

OBJECTIVE: The student can write powers of 10 in exponential form. 6-9 *9

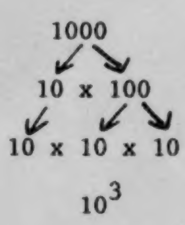
ACTIVITIES

1. Have students develop factor trees using only 10's and powers of 10.

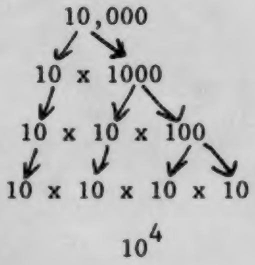
a.


100
10 x 10
10^2

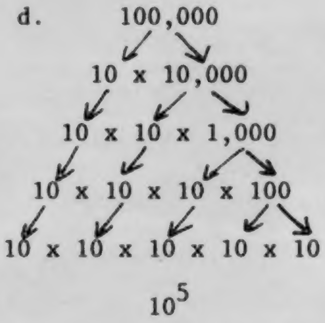
b.


1000
10 x 100
10 x 10 x 10
10^3

c.


10,000
10 x 1000
10 x 10 x 100
10 x 10 x 10 x 10
10^4

d.

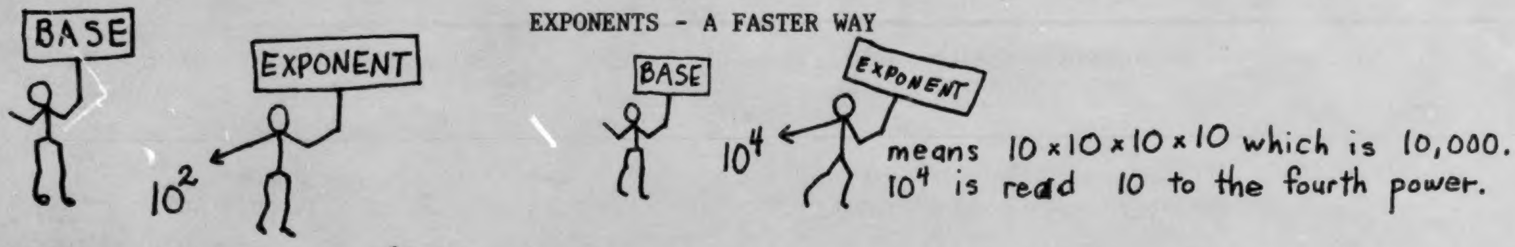

100,000
10 x 10,000
10 x 10 x 1,000
10 x 10 x 10 x 100
10 x 10 x 10 x 10 x 10
10^5

2. Have students find the standard numerals for numbers such as the following: (can be made into a match game)

a. 5^4 b. 2^3 c. 10^9 d. 2^7

e. 7^1 f. 8^5 g. 12^6 h. 9^2

3. A bulletin board display may convey the meaning of this operation. Here is a possibility:


BASE
EXPONENT
10^2
BASE
EXPONENT
10^4

EXPONENTS - A FASTER WAY

means 10 x 10 x 10 x 10 which is 10,000.
10^4 is read 10 to the fourth power.

means 10x10 which is 100. 10^2 is read 10 to the second power.

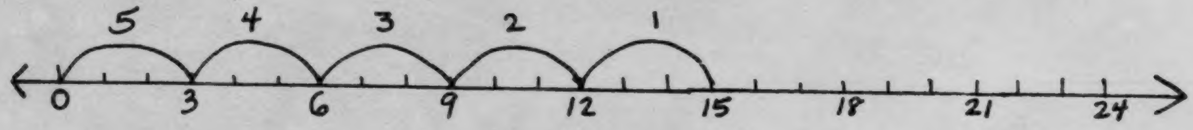
CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to use repeated subtraction to show the relationship of subtraction and division. 3-6

ACTIVITIES

1. Through the use of a number line show the students how to use subtraction to find the quotient in simple division problems.

   Example: Find the quotient: 15 ÷ 3 = _?_ (5)



Have them practice finding the quotient with problems such as the following:

(a) 12 ÷ 6 = ____ b. 15 ÷ 5 = ____ c. 18 ÷ 3 = ____

(d) 16 ÷ 4 = ____ e. 21 ÷ 3 = ____ f. 24 ÷ 4 = ____

2. Give the students varied levels of problems using the continued subtraction metnod so students can see how lengthy and time consuming the method can become.

a. $6\overline{)24}$ b. $6\overline{)36}$ c. $5\overline{)45}$

d. $7\overline{)91}$ e. $12\overline{)156}$ f. $28\overline{)532}$

3. Using half-pint milk cartons and counting blocks have the students fill the cartons so that each carton has 3 blocks. Have the student guess how many cartons will be needed. Place 3 blocks in 1 carton and write on chalkboard. Continue in this manner. Ask how many threes are in 15 and develop the sentence 5 threes in 15, 15 ÷ 3 = 5. Use the cartons and blocks to demonstrate the relationship between division and subtraction.

$$\begin{array}{rl} 15 & \\ \underline{-3} & \text{1 three} \\ 12 & \\ \underline{-3} & \text{1 three} \\ 9 & \\ \underline{-3} & \text{1 three} \\ 6 & \\ \underline{-3} & \text{1 three} \\ 3 & \\ \underline{-3} & \text{1 three} \\ 0 & \end{array}$$

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to use multiplication facts to develop division facts. 3-5

ACTIVITIES

1. Have students play "Missing Cousins." Find the missing cousins by drawing lines from the multiplication facts column A to the matching division facts in column B.

A	B
9 x 3 = 27	21 ÷ 3 = ?
5 x 5 = 25	25 ÷ 5 = ?
8 x 3 = 24	27 ÷ 3 = ?
6 x 3 = 18	40 ÷ 5 = ?
1 x 3 = 3	24 ÷ 3 = ?
7 x 3 = 21	12 ÷ 3 = ?
4 x 3 = 12	20 ÷ 5 = ?
8 x 5 = 40	18 ÷ 3 = ?
6 x 5 = 30	3 ÷ 3 = ?
4 x 5 = 20	30 ÷ 5 = ?

2. Give pairs of students two number cubes. Taking turns, students roll the two cubes; multiply the two numbers shown, e.g., 6 x 4 = 24; then name three other facts about the family.

   4 x 6 = 24, 24 ÷ 6 = 4; 24 ÷ 4 = 6

   When a student rolls doubles, there will be just two facts to name, e.g., 5 x 5 = 25 and 25 ÷ 5 = 5.

3. Use activity #1, showing each fact with counters.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to identify the parts of a division problem. 3-5 *5

ACTIVITIES

1. Work three different division examples with the students using these methods:

   Three ways to find the quotient for $4\overline{)28}$

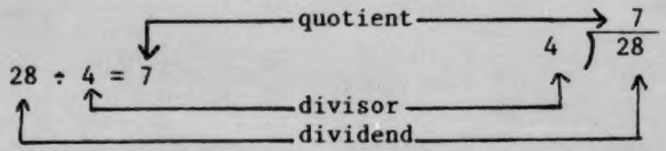
   (1) Begin at zero, add fours until you reach 28.

   (2) Begin at 28, subtract fours until you reach 0.

   (3) Think of a multiplication fact: What number times 4 is 28?

   (4) Identify 4, 28, and 7 as the quotient, divisor, or dividend.

2. Make a chart illustrating the parts of a division problem as shown. Place it in the math center for ready reference.



3. Have the students write the letters above the correct quotient to find the hidden message.

$\overset{I}{4\overline{)32}}$ $\overset{T}{8\overline{)40}}$ $\overset{V}{5\overline{)45}}$ $\overset{L}{6\overline{)18}}$

$\overset{E}{5\overline{)20}}$ $\overset{S}{9\overline{)54}}$ $\overset{D}{7\overline{)49}}$

(L)	(E)	(T)	(S)
3	4	5	6

(D)	(I)	(V)	(I)	(D)	(E)
7	8	9	8	7	4

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to:

(1) Demonstrate a knowledge of division facts (divisor 6 or less). 3-4 *4

(2) Demonstrate a knowledge of division facts. 3-5 *5

ACTIVITIES

1. Have students complete each division table within a given time limit. Division facts can later be written at random for best results.

Divide by 5		Divide by 6	Divide by 7	Divide by 8	Divide by 9
0	0	0	0	0	0
5	1	6	7	8	9
10		12	14	16	18
15		18	21	24	27
20		24	28	32	36
25		30	35	40	45
30		36	42	48	54
35		42	49	56	63
40		48	56	64	72
45		54	63	72	81

2. Have students divide into teams. Give each pair of students flash cards with the division facts below. Shuffle the cards well and place face down between the two players. Each player picks a card. The player getting the greater answer earns a point. After all the cards have been used, the player with the greater number of points wins the game.

Example:

____

9 ÷ 1

8 ÷ 1

7 ÷ 1

6 ÷ 1

5 ÷ 1

4 ÷ 1

3 ÷ 1

18 ÷ 2

16 ÷ 2

14 ÷ 2

12 ÷ 2

10 ÷ 2

8 ÷ 2

6 ÷ 2

27 ÷ 3

24 ÷ 3

21 ÷ 3

18 ÷ 3

15 ÷ 3

12 ÷ 3

3. Have students complete half of the division tables in Activity 1 within a given time limit.

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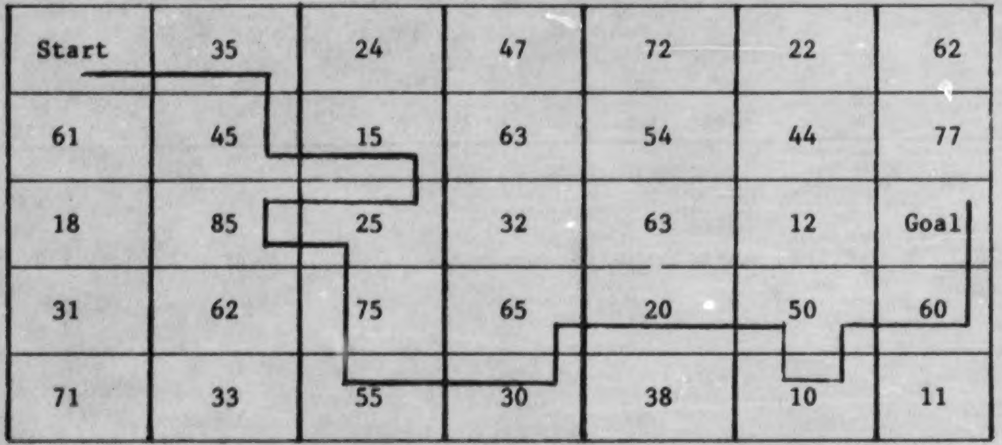
CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to recognize those numbers divisible by 5. 3-5 *5

ACTIVITIES

1. Have students complete exercises similar to the following:
   Example: Ask the students to reach the goal by moving horizontally or vertically to squares with numbers divisible by 5.



Start	35	24	47	72	22	62
61	45	15	63	54	44	77
18	85	25	32	63	12	Goal
31	62	75	65	20	50	60
71	33	55	30	38	10	11

2. Have students compute the products in the following exercise and then circle each product that is divisible by 5.

5	9	6	5	5	7	4	5
x7	x8	x7	x6	x8	x8	x9	x5

3. Have students circle the numbers divisible by 5 in each number sequence.

   a. 2, 4, 6, 8, 10, 12, 14, 16, 18, 20
   b. 3, 6, 9, 12, 15, 18, 21, 24, 27, 30
   c. 10, 20, 30, 40, 50, 60, 70, 80

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to recognize that division by zero is not possible. 4-5 *5

ACTIVITIES

1. Call 12 children to the front of the room. Select another student with a good sense of humor. Give her/him the title "The Great Divider." Have her/him divide the 12 students into 2 groups, 3 groups, 4 groups, and 6 groups. Then, direct the student to divide the group into zero groups. Lead the student and the class to the idea that division by zero is not possible because the one group is still there.

2. Play "Division Impossible." Make flash cards with the basic division facts. Insert several "trick" facts showing division by zero. The division cards are flashed to a small group. The first one to say the correct quotient gets the card. When a problem is flashed showing division by zero, the student must say "Division Impossible!" If a student gives any other response, he loses all his cards. The one with the most cards at the end of the game is the winner.

3. Make a poem about Zero to post and read to the class:

Zero
Hello! Hello!
I'm very important
as numerals go.
I show when sets
are empty.
I help in place
value, too.
But there's one
thing I cannot do.
I cannot divide.
So if you see
Division by me!
Say, "No! No! No!"

Flash division facts including some "trick" problems showing division by zero. If they are possible to divide, students say "yes." If they show division by zero, they say "No! No! No!"

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to determine by using rules of divisibility if a number is divisible by 2, 3, 4, 5, 6, 9, 10. 4-8

ACTIVITIES

1. Go over the rules for divisibility with the students:

   By 2 - If the number ends in an even number.

   By 3 - If the sum of the digits is divisible by 3.

   By 4 - If the number formed by the tens and ones digits is divisible by 4.

   By 5 - If the number ends in 5 or 0.

   By 6 - If the sum of the digits is divisible by 3 and the number is even.

   By 9 - If the sum of the digits is divisible by 9.

   By 10 - If the last digit is 0.

   The game of Buzz can be played using the divisibility rules. For example, the numbers divisible by 5 are selected as Buzz. The games goes around the room, each person saying a number in chronological order beginning 1, 2, 3, etc. When a number divisible by 5 is reached, the number is omitted and "BUZZ" is said in its place. If a person fails to say "BUZZ" or says it for the wrong number, he is out of the game. Many variations of this can be played.

2. Have students complete a chart to show which numbers are divisible by 2, 3, 4, 5, 6, 9, 10. Put an "X" in the table to show divisibility.

	N	2	3	4	5	6	9	10
A.	8	X		X				
B.	12	X	X	X		X		
C.	126	X	X			X	X	
D.	390	X	X		X	X		X
E.	567		X				X	
F.	13,251		X					
G.	37							
H.	7,530	X	X		X	X		X
I.	2,320	X		X	X			X
J.	4,566	X	X			X		

3. Make cards such as the one shown. Make a set of squares with 2, 3, 4, 5, 6, 9, 10 on them. Each student should have a card and several beans. The teacher picks a square and calls the number on it. Students cover any number(s) that are divisible by the number called. Numbers are called until someone has covered a row, column or diagonal. The winner calls "Dingo." The card is then checked.

12	5	8	100	330
18	16	75	88	70
115	9	Free	33	112
85	28	63	82	90
36	57	51	111	27

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to divide a one-digit number by a one-digit number (with remainder). 4-5 *5

ACTIVITIES

1. Give students 9 counters. Ask the students to show how many twos there are in 9. Develop the long division form below, and ask the children to remove a group of 2 counters each time 2 is subtracted.

$$\begin{array}{rrl}
 & 4 \text{ r } 1 & \\
2 & \overline{)\,9\qquad} & \\
 & \underline{-2} & 1 \text{ two} \\
 & 7 & \\
 & \underline{-2} & 1 \text{ two} \\
 & 5 & \\
 & \underline{-2} & 1 \text{ two} \\
 & 3 & \\
 & \underline{-2} & 1 \text{ two} \\
 & 1 &
\end{array}$$

2. Have students supply the missing dividends in similar problems. Example:

$$\begin{array}{rr}
 & 2 \\
3 & \overline{)\square} \\
 & \underline{-6} \\
 & 0
\end{array}
\qquad
\begin{array}{rr}
 & 2 \\
3 & \overline{)\square} \\
 & \underline{-6} \\
 & 1
\end{array}
\qquad
\begin{array}{rr}
 & 2 \\
3 & \overline{)\square} \\
 & \underline{-6} \\
 & 2
\end{array}
\qquad
\begin{array}{rr}
 & 3 \\
5 & \overline{)\square} \\
 & \underline{-15} \\
 & 0
\end{array}
\qquad
\begin{array}{rr}
 & 3 \\
5 & \overline{)\square} \\
 & \underline{-15} \\
 & 1
\end{array}
\qquad
\begin{array}{rr}
 & 3 \\
5 & \overline{)\square} \\
 & \underline{-15} \\
 & 2
\end{array}$$

3. Review multiplication facts. Have students furnish answers for particular facts.

$$\begin{array}{r} 2 \\ \underline{\times 3} \\ 6 \end{array}
\qquad
\begin{array}{r} 3 \\ \underline{\times 1} \\ 3 \end{array}
\qquad
\begin{array}{r} 4 \\ \underline{\times 2} \\ 8 \end{array}
\qquad
\begin{array}{r} 2 \\ \underline{\times 2} \\ 4 \end{array}
\qquad
\begin{array}{r} 1 \\ \underline{\times 2} \\ 2 \end{array}
\qquad
\begin{array}{r} 3 \\ \underline{\times 3} \\ 9 \end{array}
\qquad
\begin{array}{r} 4 \\ \underline{\times 1} \\ 4 \end{array}$$

Then write related division problems for the students to solve.

$$3\overline{)6} \qquad 1\overline{)3} \qquad 2\overline{)8} \qquad 2\overline{)4} \qquad 1\overline{)2} \qquad 3\overline{)9} \qquad 1\overline{)4}$$

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to:

(1) divide a two-digit number by a one-digit number (no remainder). 4-5 *5
(2) divide a three-digit number by a one-digit number (no remainder). 4-5 *5
(3) divide a four-digit number by a one-digit number (no remainder). 4-5 *5

ACTIVITIES

1. Have students complete problems similar to the following:

Example: $\begin{array}{r}\triangle\\3\overline{)21}\end{array}$ $\begin{array}{r}5\\2\overline{)\triangle}\end{array}$ $\begin{array}{r}7\\\triangle\overline{)14}\end{array}$ $\begin{array}{r}\triangle\\8\overline{)56}\end{array}$

You may then wish to give students more difficult problems.

2. Have students solve the following division problems and write the related multiplication problem.

Example:

$$\begin{array}{r}7\\2\overline{)14}\\\underline{14}\\0\end{array}\qquad\begin{array}{r}7\\\underline{\times2}\\14\end{array}$$

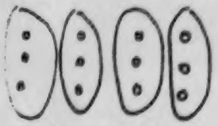
$2\overline{)48}$ $3\overline{)36}$ $4\overline{)60}$

$5\overline{)85}$ $6\overline{)72}$ $5\overline{)90}$

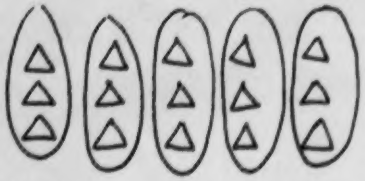
$6\overline{)84}$ $7\overline{)91}$

3. Given illustrations similar to the following, have students write division sentences for each illustration.

Example:



12 ÷ 3 = 4



15 ÷ 3 = 5

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to divide a two-digit number by a one-digit number (with remainder). 4-5 *5

ACTIVITIES

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1. Have students use long division and write a division problem for each example.

$$\begin{array}{r} 6 \text{ r } 4 \\ 6\,\overline{)\,40} \\ -36 \\ \hline 4 \end{array}$$

a. How many 6's in 40?
b. How many 6's in 50?
c. How many 6's in 37?
d. How many 7's in 54?
e. How many 7's in 30?
f. How many 7's in 32?

2. Have students complete problems similar to the following:

$$\begin{array}{ccccc}
\begin{array}{r} 4 \\ 7\,\overline{)\,31} \\ \enclose{circle}{-28} \\ \hline \overset{3}{\triangle} \end{array} &
\begin{array}{r} 8 \\ 4\,\overline{)\,34} \\ -\triangle \\ \hline \triangle \end{array} &
\begin{array}{r} 7 \\ 5\,\overline{)\,39} \\ -\triangle \\ \hline \triangle \end{array} &
\begin{array}{r} 3 \\ 9\,\overline{)\,31} \\ -\triangle \\ \hline \triangle \end{array} &
\begin{array}{r} 5 \\ 8\,\overline{)\,46} \\ - \\ \hline \triangle \end{array}
\end{array}$$

$$\begin{array}{cccc}
\begin{array}{r} \\ 4\,\overline{)\,27} \\ -\triangle \\ \hline \triangle \end{array} &
\begin{array}{r} \\ 3\,\overline{)\,19} \\ -\triangle \\ \hline \triangle \end{array} &
\begin{array}{r} \\ 8\,\overline{)\,19} \\ -\triangle \\ \hline \triangle \end{array} &
\begin{array}{r} 5 \\ 3\,\overline{)\,17} \\ -15 \\ \hline \triangle \end{array}
\end{array}$$

3. Using counters have students complete the following problems:

Example:

$$\begin{array}{r} 2 \text{ r } 1 \\ 6\,\overline{)\,13} \\ -12 \\ \hline 1 \end{array} \qquad 8\,\overline{)\,19} \qquad 7\,\overline{)\,15} \qquad 5\,\overline{)\,16} \qquad 2 \;\; \overline{\;13}$$

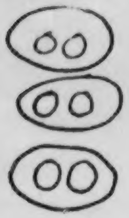
Note: Listing the steps of division may aid comprehension of the division operation.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to check division computation by multiplication and addition. (Dividend = quotient x divisor + remainder). 3-8

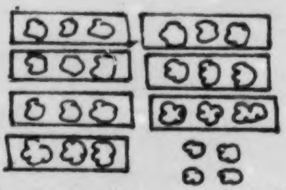
ACTIVITIES

1. Using the illustration below, ask a student to write on the chalkboard the division problem that goes with it. Then have another student write the multiplication-addition equation.



$$\begin{array}{r} 2 \\ 3\,\overline{)\,7} \\ -6 \\ \hline 1 \end{array}$$

(2 x 3) + 1 = 7



$$\begin{array}{r} 3 \\ 7\,\overline{)\,25} \\ -21 \\ \hline 4 \end{array}$$

(3 x 7) + 4 = 25

2. Have students write a multiplication-addition equation for each division problem.

$$\begin{array}{r} 6 \\ 4\,\overline{)\,27} \\ -24 \\ \hline 3 \end{array} \qquad \begin{array}{r} 7 \\ 3\,\overline{)\,37} \\ -35 \\ \hline 2 \end{array} \qquad \begin{array}{r} 9 \\ 8\,\overline{)\,78} \\ -72 \\ \hline 6 \end{array} \qquad \begin{array}{r} 7 \\ 6\,\overline{)\,47} \\ -42 \\ \hline 5 \end{array} \qquad \begin{array}{r} 5 \\ 9\,\overline{)\,47} \\ -45 \\ \hline 2 \end{array}$$

(6 x 4) + 3 = 27

3. Have students find the missing remainder in the multiplication-addition equation below.

$$\begin{array}{r} 8 \\ 3\,\overline{)\,26} \\ -24 \\ \hline \end{array}$$ (8x3) + △ = 26

$$\begin{array}{r} 6 \\ 3\,\overline{)\,19} \\ 18 \\ \hline \end{array}$$ (6x3) + △ = 19

$$\begin{array}{r} 9 \\ 4\,\overline{)\,39} \\ 36 \\ \hline \end{array}$$ (9x4)+△ = 39

$$\begin{array}{r} 4 \\ 6\,\overline{)\,27} \\ 24 \\ \hline \end{array}$$ (4x6) + △ = 27

$$\begin{array}{r} 3 \\ 6\,\overline{)\,22} \\ 18 \\ \hline \end{array}$$ (3x6) + △ = 22

$$\begin{array}{r} 4 \\ 9\,\overline{)\,37} \\ 36 \\ \hline \end{array}$$ (9x4) + △ = 37

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to: (1) divide a three-digit number by one-digit number (no remainder), (2) divide a four-digit number by a one-digit number (no remainder), (3) divide a three-digit number by a one-digit number (with remainder); (4) divide a four-digit number by a one-digit number (with remainder). 4-5 *5

ACTIVITIES

1. Have students use long division and write a division problem for each example.

   a. How many 70's in 180?

   b. How many 5's in 2550?

   c. How many 3's in 964?

   d. How many 6's in 2431?

$$\begin{array}{r} 73 \\ 5\,\overline{)\;365} \\ \underline{-35} \\ 15 \\ \underline{15} \end{array}$$

2. Have students complete problems similar to the following:

   $5\,\overline{)350}$ $4\,\overline{)424}$ $8\,\overline{)3360}$ $7\,\overline{)2940}$

   $4\,\overline{)409}$ $5\,\overline{)425}$ $3\,\overline{)2476}$ $2\,\overline{)1845}$

3. Have students use counters to complete problems similar to the following:

   $6\,\overline{)132}$ $5\,\overline{)1550}$ $4\,\overline{)209}$ $3\,\overline{)1540}$

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to divide by a multiple of 10. 5-6 *6

ACTIVITIES

1. Review the relation between multiplication and division.

a. $4 \times 8 = 32$ so $8\overline{)\,32}$

$4 \times 80 = 320$ so $\begin{array}{r} 4 \\ 80\overline{)\,320} \end{array}$

b. $7 \times 9 = 63$ so $9\overline{)\,63}$

$7 \times 90 = 630$ so $\begin{array}{r} 7 \\ 90\overline{)\,630} \end{array}$

Point out that 63 ÷ 9 is the same as 630 ÷ 90 because both the divisor and dividend have been multiplied by 10. Help the students to see that they can apply their knowledge of the basic facts to find the quotient when dividing by tens. Give students practice in finding the quotients for pairs of examples such as the following:

a. $\boxed{\begin{array}{l} 7\overline{)\,56} \\ 70\overline{)\,560} \end{array}}$ b. $\boxed{\begin{array}{l} 4\overline{)\,16} \\ 40\overline{)\,160} \end{array}}$ c. $\boxed{\begin{array}{l} 5\overline{)\,40} \\ 50\overline{)\,400} \end{array}}$

The teacher will have the pairs on cards. Each student will also need digit cards 1-9. When a pair of division problems is flashed by the teacher, students hold up the card showing the common quotient.

821

822

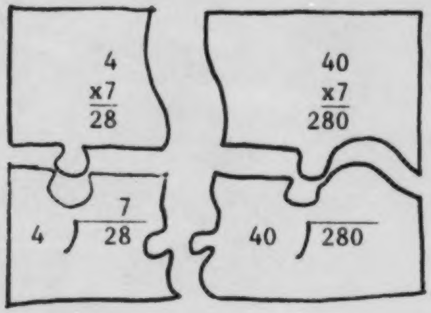
2. Have students divide to complete tables like the following:

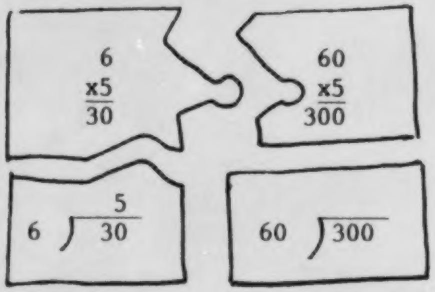
	20
40	
180	
60	
160	
80	
140	

	30
90	
180	
150	
60	
120	
270	

	50
250	
100	
150	
350	
400	
300	

3. Prepare puzzles with sets of related facts similar to these:


4
x7
28
40
x7
280
7
4)28
40)280


6
x5
30
60
x5
300
5
6)30
60)300

Students complete the puzzle and decide on the final quotient. Use numerals small enough that concrete objects such as tooth picks can be used to demonstrate the process.

823

824

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to divide:

1. a two-digit number by a two-digit number (no remainder). 4-6 *6
2. a three-digit number by a two-digit number (no remainder). 4-7 *7
3. a four-digit number by a two-digit number (no remainder). 5-7 *7
4. a two-digit number by a two-digit number with remainder. 5-7 *7
5. a three-digit number by a two-digit number with remainder. 5-7 *7
6. a four-digit number by a two-digit number with remainder. 5-7 *7
7. a five-digit number by a two-digit number with remainder. 5-7 *7

ACTIVITIES

1. To provide concrete materials and extra motivation bring in a bag of penny candy. Bring at least two pieces per child. Tell the students they must divide the candy equally among the class members. Let them decide on ways to do this: whether to distribute one to each child until it is all given out or divide mathematically. Review with students the steps in dividing by tens, and work the problem cooperatively.

   If there are 32 students and 64 pieces of candy, divide the number of pieces by the number of students.

   $$32\,\overline{)\,64}$$

   Emphasize the following steps which should be recorded on a poster entitled: "Be a Dandy Divider."

   To correlate with the activity, a C might be taped over the D, so that the sign reads, "Be a Candy Divider."

BE A CANDY DIVIDER

1. Round the divisor to the nearer ten.
2. Use basic facts to estimate the quotient.
3. Multiply the divisor by the quotient.
4. Subtract and check to make sure the remainder is less than the divisor.
5. Write the quotient above the dividend.

So, in dividing 64 by 32, round 32 to 30, and think of how many threes there are in 6. Multiply 2 x 32. Subtract and write the quotient, 2.

$$\begin{array}{r} 2 \\ 32 \overline{)\ 64} \\ \underline{-64} \\ 0 \end{array}$$

Have students work other examples on the board. If they are correct, they get to eat the candy.

2. For students who understand dividing with no remainder, give problems having remainders. Use any gameboard with spaces to move. Write division examples on cards such as:

$51 \overline{)\ 415}$ or $42 \overline{)\ 256}$

Students draw a card, complete the division example, and move the number of spaces shown by the remainder.

3. To review rounding the divisor to the nearest 10, give two students the numerals 1-9 on cards. One student turns up a card for the tens. The other turns up a card for the ones. Using a number line to assist them, they round the number to the nearest 10.

$\boxed{4}\ \boxed{3} \rightarrow 40$ $\boxed{5}\ \boxed{6}$ 60

As follow up, introduce the next step in division - deciding the basic fact to estimate the quotient. Give two students problems on cards. Students are to select a card, round off the divisor to the nearest 10 and give the basic fact that will help them estimate the quotient. Have correct responses on the back so that partners may check each other's work.

Sample:

$\boxed{47 \overline{)\ 141}}$

Front

47 rounds off to 50.
Divide 5 into 14.

Back

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to express remainders as fractions. 5-6 *6

ACTIVITIES

1. Give the students examples of division problems which are already worked.

   Examples: $\begin{array}{r} 98 \text{ r } 18 \\ 24\overline{)2154} \end{array}$ $\begin{array}{r} 70 \text{ r } 34 \\ 80\overline{)5634} \end{array}$ $\begin{array}{r} 18 \text{ r } 10 \\ 52\overline{)946} \end{array}$

   Have the students write a fraction using the remainder and divisor and reduce it to lowest terms.

   Examples: $\frac{18}{24} = \frac{3}{4}$ $\frac{34}{80} = \frac{17}{40}$ $\frac{10}{52} = \frac{5}{26}$

2. Have the students work in pairs. Give each student a division problem. Each student completes the example being sure the remainder is a fraction in lowest terms. The first student to find the correct answer receives one point--repeat with additional problems.

3. Give the students examples of division problems which are already worked.

   Examples: $\begin{array}{r} 79 \text{ r } 3 \\ 42\overline{)3321} \end{array}$ $\begin{array}{r} 38 \text{ r } 40 \\ 90\overline{)3460} \end{array}$ $\begin{array}{r} 53 \text{ r } 2 \\ 38\overline{)1978} \end{array}$

   Give them a list of lowest term fractions to be matched with the remainders written as fractions.

   Examples: $\frac{3}{42} = \frac{1}{14}$; $\frac{40}{90} = \frac{4}{9}$; $\frac{2}{38} = \frac{1}{19}$

829 830

CONTENT: Whole Numbers Operations

OBJECTIVE: The student will be able to find the quotient when the divisor is 10, 100 or 1000.

6-

ACTIVITIES

1. Have the students complete a chart such as the following:

		÷ 10	÷ 100	÷ 1000
1.	9,721	972.1	97.21	9.721
2.	3,184	318.4	31.84	3.184
3.	17,987	1798.7	179.87	17.987
4.	75,432	7543.2	754.32	75.432
5.	3,782	378.2	37.82	3.782
6.	98,268	9826.8	982.68	98.268
7.	62,645	6264.5	626.45	62.645
8.	30,464	3046.4	304.64	30.464
9.	92.81	9.281	.9281	.09281
10.	757.52	75.752	7.5752	.75752

Note: Answers may also be given as fractions. EXAMPLE: 972.1 = 972 1/10

2. Have the students complete exercises such as the following:

A. 3249.1 ÷ ______ = 3.2491 (1,000)
B. 290,000 ÷ ______ = 290 (1,000)
C. 46,312 ÷ ______ = 463.12 (100)
D. 5874.3 ÷ ______ = 587.43 (10)
E. 679.1 ÷ ______ = .6791 (1000)
F. 3249.1 ÷ ______ = 324.91 (10)
G. 290,000 ÷ ______ = 2900 (100)
H. 46,312 ÷ ______ = 46.312 (1000)
I. 5874.3 ÷ ______ = 58.743 (100)
J. 679.1 ÷ ______ = 67.91 (10)

3. Have the students complete charts such as the following:

2600	÷	100	=	26
÷		÷		÷
100		10	=	10
=		=		=
26	÷	10		2.6

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to find the quotient when the divisor is a multiple of 10, 100, or 1,000. 6-8

ACTIVITIES

1. Prepare a series of division exercises as shown for the students to solve:

800 ÷ 2 = (400)	800 ÷ 20 = (40)	800 ÷ 200 = (4)
1200 ÷ 2 = (600)	1200 ÷ 20 = (60)	1200 ÷ 200 = (6)
1600 ÷ 2 = (800)	1600 ÷ 20 = (80)	1600 ÷ 200 = (8)
2000 ÷ 2 = (1000)	2000 ÷ 20 = (100)	2000 ÷ 200 = (10)

After they have solved these, have them compare the answer for each column. Ask them to solve the problem in Column A, and to write the answers for Column B and Column C by using the pattern they observed in the previous exercises.

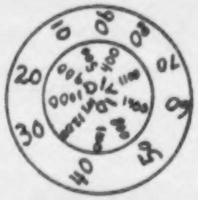
A	B	C
2700 ÷ 9 = (300)	2700 ÷ 90 = (30)	2700 ÷ 900 = (3)
3600 ÷ 9 = (400)	3600 ÷ 90 = (40)	3600 ÷ 900 = (4)
4500 ÷ 9 = (500)	4500 ÷ 90 = (50)	4500 ÷ 900 = (5)
5400 ÷ 9 = (600)	5400 ÷ 90 = (60)	5400 ÷ 900 = (6)

2. Have the students solve division problems involving large numbers such as the following:

$\begin{array}{r}(350\ \text{R}65)\\ 200\,\overline{)70{,}065}\end{array}$ $\begin{array}{r}(312\ \text{R}400)\\ 800\,\overline{)250{,}000}\end{array}$ $\begin{array}{r}(31\ \text{R}225)\\ 400\,\overline{)12{,}625}\end{array}$

$\begin{array}{r}(84\ \text{R}2304)\\ 3000\,\overline{)254{,}304}\end{array}$ $\begin{array}{r}(31\ \text{R}3426)\\ 6000\,\overline{)189{,}426}\end{array}$ $\begin{array}{r}(55\ \text{R}1825)\\ 9000\,\overline{)496{,}825}\end{array}$

3. Prepare disks such as shown using a large disk and a smaller one put together with a brad. Have the students use the disks and write as many problems as possible. The students may then solve the problems.



CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to divide more than three digits by a 3-digit divisor. 6-8

ACTIVITIES

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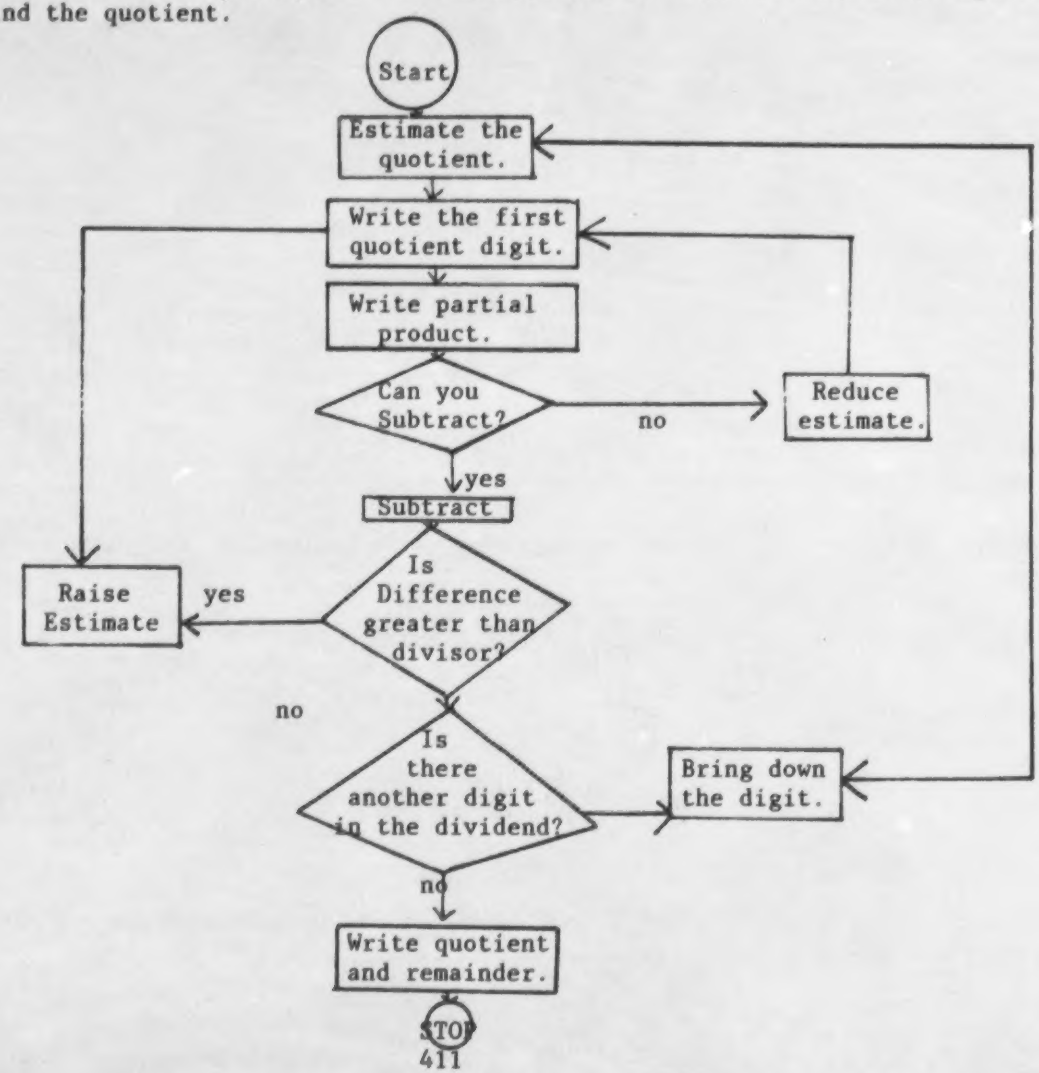
1. Write a problem such as: $397 \overline{)246,893}$ on the chalkboard. Guide students through the path on a flow chart to find the quotient.


Start
Estimate the quotient.
Write the first quotient digit.
Write partial product.
Can you Subtract?
no
Reduce estimate.
yes
Subtract
Is Difference greater than divisor?
yes
Raise Estimate
no
Is there another digit in the dividend?
Bring down the digit.
no
Write quotient and remainder.
STOP

2. Have students find the missing numbers as in the following:

$$\begin{array}{rcccc}
 & & & 2 & \boxed{7} \\ \cline{2-5}
23\,\boxed{5}\;\big) & 6 & 4 & 3 & 0 \\
 & \boxed{4} & \boxed{7} & 0 & \\ \cline{2-5}
 & 1 & \boxed{7} & 3 & \boxed{0} \\
 & 1 & 6 & \boxed{4} & 5 \\ \cline{2-5}
 & & & 8 & \boxed{5}
\end{array}
\qquad\qquad
\begin{array}{rcccccc}
 & & & & 8 & 9 & \boxed{3} \\ \cline{2-7}
\boxed{8}\;\;17\;\big) & 7 & \boxed{3} & 0 & \boxed{2} & 3 & \boxed{6} \\
 & 6 & 5 & 3 & 6 & & \\ \cline{2-6}
 & & 7 & \boxed{6} & 6 & \boxed{3} & \\
 & & 7 & 3 & \boxed{5} & \boxed{3} & \\ \cline{3-7}
 & & & 3 & \boxed{1} & 0 & 6 \\
 & & & \boxed{2} & \boxed{4} & 5 & 1 \\ \cline{4-7}
 & & & & \boxed{6} & 5 & \boxed{5}
\end{array}$$

3. Show the students how to use the technique of determining the quotient in stages along the column at the right.

$$\begin{array}{rrr}
325\;\big) & \overline{13450} & \\
 & \underline{13000} & 40 \\
 & 450 & \\
 & \underline{325} & \underline{+1} \\
\text{R} & 125 & 41
\end{array}
\qquad\qquad
\begin{array}{rrr}
59\;\big) & \overline{99982} & \\
 & \underline{57900} & 100 \\
 & \underline{42082} & \\
 & \underline{40530} & 70 \\
 & 1552 & \\
 & \underline{1158} & \underline{+2} \\
 & 394 & 172
\end{array}$$

837

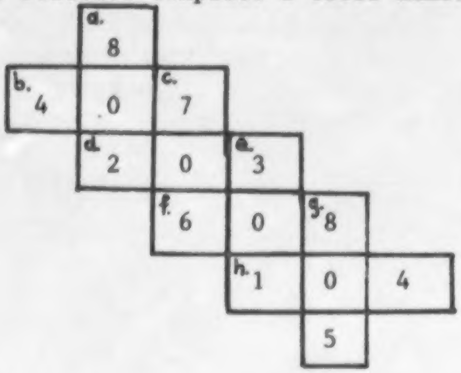
838

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to find the quotient when there is one or more zeros in the quotient. 6-8

ACTIVITIES

1. Have the students complete a cross number puzzle such as the following:



	Across		Down
b.	$32\overline{)13,024}$	a.	$49\overline{)39,298}$
d.	$68\overline{)13,804}$	c.	$95\overline{)67,070}$
f.	$44\overline{)26,752}$	e.	$92\overline{)27,692}$
h.	$26\overline{)2,704}$	g.	$72\overline{)57,960}$

2. Have the students list different ways the digits 1, 8, 9, 9, 9 can be arranged so that when divided by 9, there will be a zero in the quotient:

91,899	99,198	91,989	99,198	91,998	99,918
98,199	99,981	98,919	99,891	98,991	99,819

3. Have the students make their own sets of flash cards involving zeros in the quotient. Sample cards:

Front	Back
75 ÷ 7	10 R5

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to estimate products. 5-10

ACTIVITIES

1. As a preliminary activity for estimating in multiplication, review estimating in addition.

Example:	427	400
	+654	+700
estimated sum		1100

735 ______	923 ______	2674 ______	1476 ______	925 ______	$763 ______
+316 ______	+586 ______	+1516 ______	+1298 ______	+316 ______	+193 ______

2. Use multiples of 10, 100, or 1,000 for each missing factor. Example:

   a. To estimate 784 x 8, we can find the product of __________ x 8.

   b. To estimate 63 x 78, we can find the product of 60 x __________.

   c. To estimate 6 x 4195, we can find the product of 6 x __________.

   d. To estimate 63 x 295, we can find the product of 60 x __________.

   e. To estimate 381 x 714, we can find the product of __________ x 700.

3. Write ten three- or more- digit numerals on strips of paper and put in a bag. Have students work in pairs. They take turns drawing 2 papers from the bag. The student uses the nearest hundreds to estimate the answer. Students return the papers to the bag each time. A point is scored for each correct estimate. The first student to score 10 points is the winner.

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to estimate quotients. 5-8

ACTIVITIES

1. Illustrate on the chalkboard:

$40\overline{)85}$ To estimate the quotient when dividing 85 by 40, we may divide 8 by 4.

Step 1.

$$\begin{array}{r} 2 \\ 4\overline{)8} \\ -8 \\ \hline 0 \end{array}$$

Step 2.

$$\begin{array}{r} 2 \\ 40\overline{)80} \\ -80 \\ \hline 0 \end{array}$$

Step 3.

$$\begin{array}{r} 2 \\ 40\overline{)85} \\ -80 \\ \hline 5 \end{array}$$

2. Give pairs of students division problems on cards. Each student writes an estimated quotient. The student with the estimate closest to the correct answer scores a point.

3. Use the above example to match the following:

a. $2\overline{)8}$ $22\overline{)749}$

b. $2\overline{)6}$ $49\overline{)249}$

c. $3\overline{)6}$ $34\overline{)598}$

d. $3\overline{)12}$ $24\overline{)613}$

e. $5\overline{)25}$ $33\overline{)123}$

CONTENT: Whole Number Operations

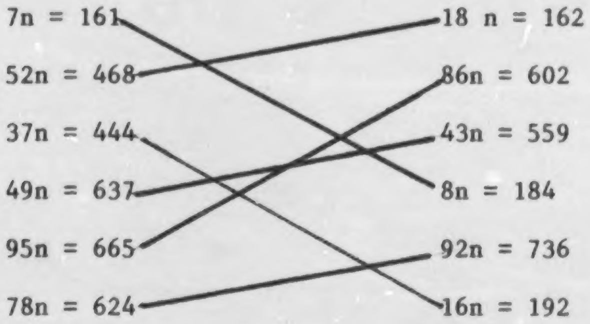
OBJECTIVE: The student will be able to solve simple linear equations with one unknown whose root is a whole number (two-step solution). 7-9 *9

ACTIVITIES

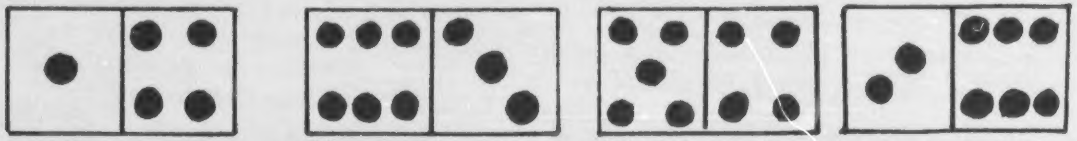
---

1. Cut several strips of heavy paper. On each strip write an equation such as $2x + 5 = 11$ or $12 - 2n = 4$. Divide the class into teams of three members each. Have each team leader select one of these strips. Have his team use the correct form and determine the missing part. When each team has completed its work, the team leader reports to the teacher to check. The team may be given additional sentences or serve as helpers to those having difficulty.

2. Have students solve the equations below. Have them draw lines to match those that have the same answer.



3. Make flash card dominoes such as the following:



Have the students write a mathematical sentence which describes the domino picture. ($1 + 4 = n$, $6 + 3 = n$, $5 + 4 = n$, $2 + 6 = n$) Have them solve for the unknown.

846

845

CONTENT: Whole Number Operations

OBJECTIVE: The student will be able to compute the average on not more than five numbers each with a maximum of three digits. 7 *7

ACTIVITIES

1. Have the students look through the sports section of the newspaper and find scores for the teams they are interested in. Then have them find the average score for all the teams.

2. Have the students use reference books such as almanacs, encyclopedias, or record books to find information such as heights of buildings, lengths of rivers or bridges, stadium capacities, etc. Then have them find the average heights, lengths, etc., of the things they find. Averages may be checked by the following technique.

   If the sets are 8, 9, 6, 7, 7, and 5, find the average.

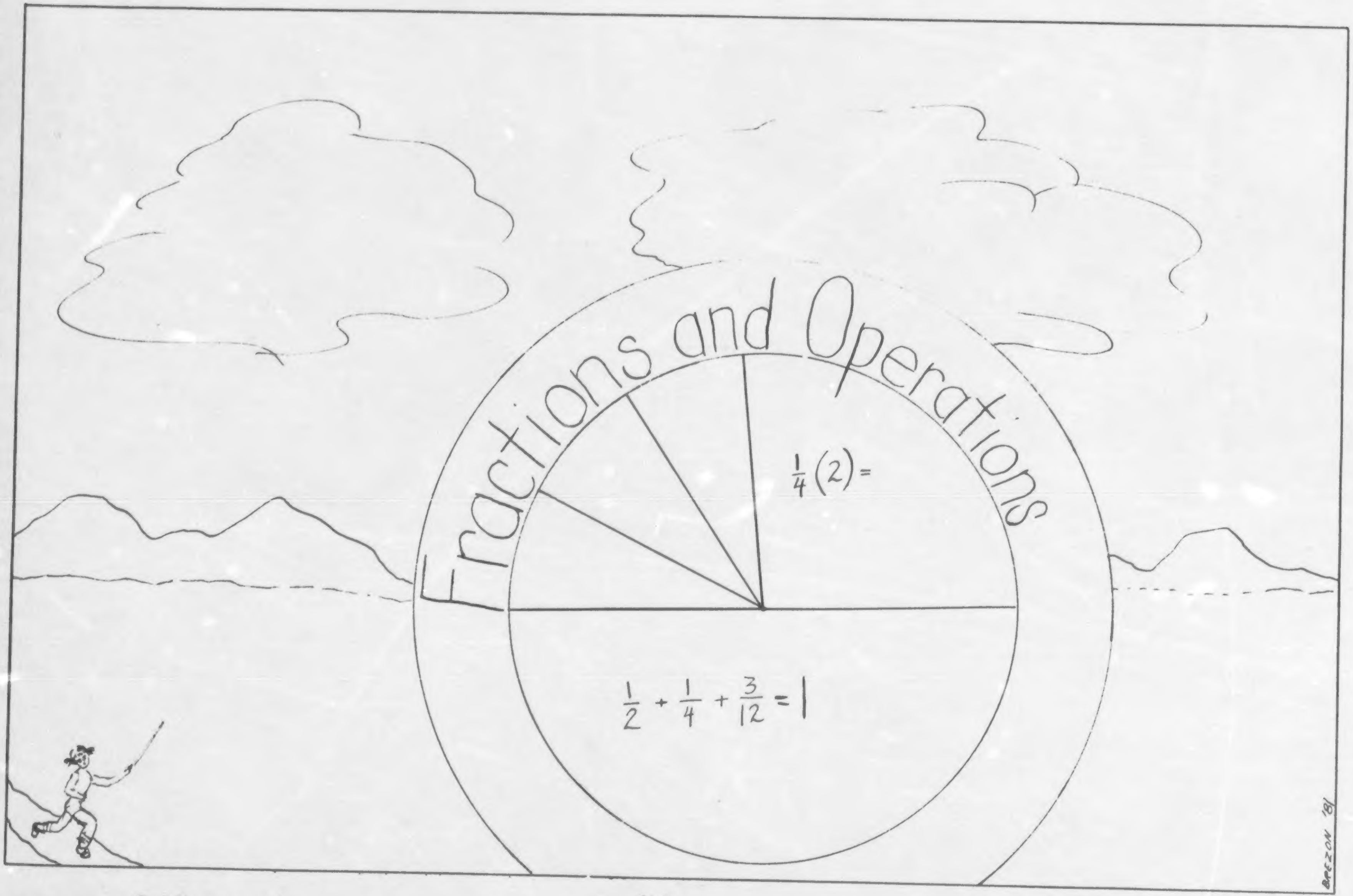
   $$6\overset{\displaystyle 7}{\overline{)42}}$$

   Check:
   8 is 1 above 7
   9 is 2 above 7
   6 is 1 below 7
   5 is 2 below 7
   7's are neither above or below

   $$\begin{array}{l} 2\ (9) \\ \underline{1\ (8)} \\ 1\ (6) \quad 3 = 3 \\ 2\ (5) \\ 2 + 1 = 3 \end{array}$$

   To check: Compare the average to each set. If the set is more than the average, write the difference above a line; if less, the difference below. The sum above and below will be equal.

3. Share a list of grades that the students have made on previous quizzes. Have the students find the average on their own personal grades.


Fractions and Operations
$\frac{1}{4}(2) =$
$\frac{1}{2} + \frac{1}{4} + \frac{3}{12} = 1$
BREZON '81

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to recognize:

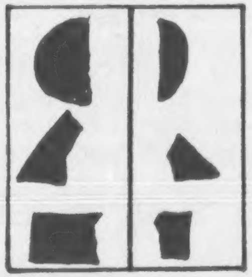
(1) two unequal parts. K
(2) larger and smaller. K
(3) largest and smallest part. K

ACTIVITIES

---

1. Provide a bag of cookies and paper towels for the students. Demonstrate how to break the cookie into two unequal parts. Ask students to break their cookies into unequal parts and place the parts on the towel. Have students point to the larger part and the smaller part. Ask the students to break the smaller part into two more unequal pieces. Have students point to the largest part and the smallest part.

2. Provide the students with four or five colored shapes and a piece of construction paper folded down the middle. Have them cut the shapes into two unequal parts. Demonstrate how to make a simple picture graph like the following:



3. Provide a strip of construction paper, crayons and scissors. Ask students to cut the strip of paper into two unequal parts. Have them put a red mark on the larger part and a blue mark on the smaller part. After students have identified these, have them cut the smaller part into two unequal parts. Now have them mark the largest part with red, and the smallest part with green.

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to:
(1) recognize 1/2 of a concrete object. K *K
(2) recognize 1/4 of a concrete object. 1-2 *2
(3) recognize 1/3 of a concrete object. 1-2 *2

ACTIVITIES

1. During snack time, arrange to serve things that are easily cut or broken into halves. Apples, oranges, carrot and celery sticks, graham crackers, and pieces of cheese are excellent for this purpose. Have children break into two or four parts an item they are about to eat and tell whether or not they made halves or fourths.

   Materials: Apple, orange, celery, or other foods that can be divided.

2. Give each child a small piece of clay. Suggest that the children roll their clay into the shape of a banana. Then say, "Separate your clay banana into halves. Show me one half. Now show me the other half. How many halves do you have?" Children should conclude that when something is separated into two parts that are the same size, each part is a half. Repeat the activity having children create a brick shape, a ball or an egg shape, and finally, any shape they choose. From time to time, you might divide a piece of clay into two parts that are definitely not halves, or into four equal parts. Expect children to create halves that are not exact duplicates but that are about the same size and shape in relation to each other.

   Materials: Clay

   (Variation) Use construction paper or paper plates and scissors. Effective if clay is unavailable.

3. Divide the flannelboard in half. On one side have the children place the cut-outs that are halves and on the other side place the cut-outs that are fourths.

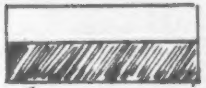
   Materials: Flannelboard, felt objects divided into halves and fourths.

CONTENT: Fractions and Operations

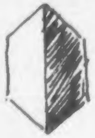
OBJECTIVE: The student will be able to identify the fractions one-half, one-third, and one-fourth, telling what each term means. 1-2 *2

ACTIVITIES

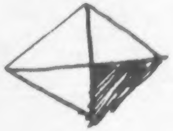
1. Draw spaces similar to the ones below on the chalkboard. Have the children take turns at the chalkboard to circle the correct answer.



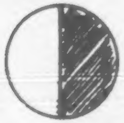
[✓ $\frac{1}{2}$] $\frac{1}{3}$ $\frac{1}{4}$



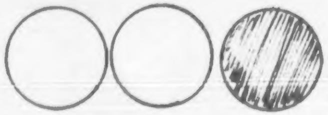
$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$



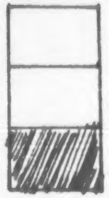
$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$



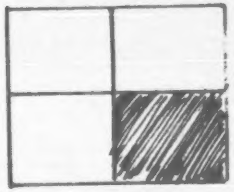
$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$



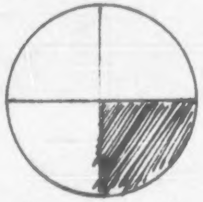
$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$



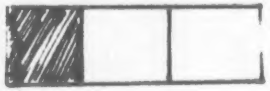
$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$



$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$

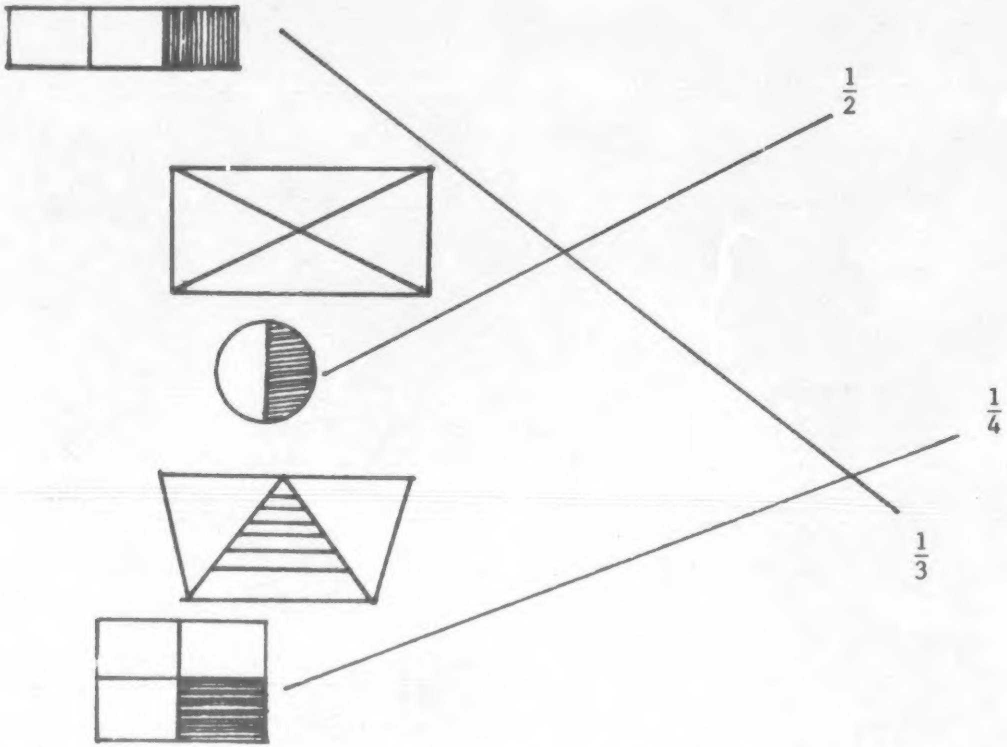


$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$



$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$

2. Match



3. Give the children rectangular sheets of paper. Have the children fold the papers in half, from side to side, then open the papers and make another fold, from top to bottom. Ask: How many parts? Are they the same size? Have the children color one-fourth of their paper.

CONTENT: Fractions and Operations

OBJECTIVE: The student will read and write the symbol for the fractional part of a region (1/2, 1/3, 1/4). 2-3 *3

ACTIVITIES

---

1. Give each child a piece of construction paper. Tell the children to fold it in half and cut out a design or shape or pattern. Caution them not to cut along the folded edge. You might show some folded examples of irregular shapes, geometric figures, or simple objects. After the children have finished have them open their papers. Ask them how many parts there are, if the parts are equal, and if each part is 1/2 of the whole figure.

   (Variation) Have students fold paper into halves, thirds, or fourths. After children have finished, have them open their papers and color and label each fractional part.

2. Have students draw six objects on a piece of paper. Then have them shade in 1/2 on two objects, 1/3 on two objects, and 1/4 on two objects.

3. Use a piece of yarn 4 or 5 feet long. Separate objects in the room such as book covers, charts, desk tops or the chalkboard into two parts that may or may not be equal. For each object ask if each part is 1/2 of the object.

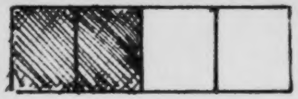
   Also use two or three pieces to separate objects into fourths.

CONTENT: Fractions and Operations

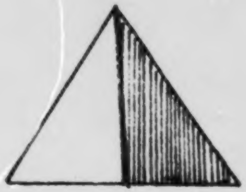
OBJECTIVE: The student will be able to shade in the fractional part (1/2, 1/3, 1/4) of a given figure. 2-3 *3

ACTIVITIES

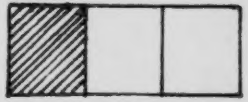
1. Give the students examples of shaded areas such as the following. Have them decide which of the three fractions, 1/2, 1/3 or 1/4 are pictured in the drawing.



$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$



$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$



$\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$

2. Have the students draw at least two examples of each fraction and show the fraction by shading in the correct amount of space.

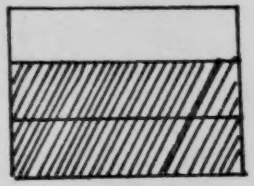
3. Give the children rectangles of the same size and shape made from cardboard. Have one rectangle colored red. Have the children place the rectangles together on a display board to form a larger rectangle. Ask them how many parts are red and how many parts there are altogether.

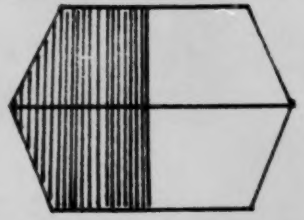
CONTENT: Fractions and Operations

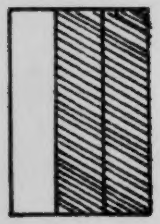
OBJECTIVE: The student will be able to recognize 2/3, 2/4, and 3/4. 2-3

ACTIVITIES

1. Draw shapes like the following on the chalkboard. Ask the children to identify those that show two-thirds.







Repeat the above exercise, this time dividing the shapes to show two-fourths or three-fourths.

2. Make cards with the fractions 1/2, 1/3, 1/4, 2/3, 2/4, 3/4. Also, make cards with shapes to correspond to those fractions. Have the players turn all the cards face down. The first player picks a card. Then he or she picks another card, trying to match the fraction with the correct shape, or vice versa. If the cards match, the player keeps those cards. The player with the most cards at the end of the game is the winner.

3. Let the children collect pictures from magazines of familiar objects for use in a fraction scrapbook or to make a bulletin board display. Help children determine whether to cut their pictures into halves, thirds, or fourths and mount them on construction paper.

863 864

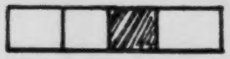
CONTENT: Fractions and Operations

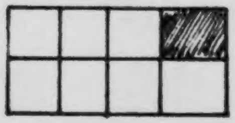
OBJECTIVE: The student will be able to identify fractional parts of a whole:
(1) 1/5, 1/6. 3-4 *4
(2) 1/8, 1/10. 4-5 *5

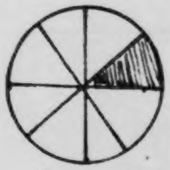
ACTIVITIES

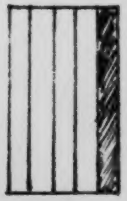
1. Have the students match the fractional number with the shaded parts.

MATCH

(1)  $\frac{1}{5}$

(2)  $\frac{1}{8}$

(3)  $\frac{1}{4}$

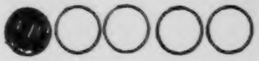
(4)  $\frac{1}{6}$

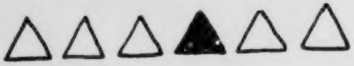
2. Have students follow the directions in each sentence below.

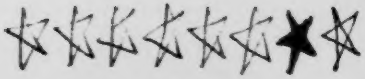
   a. Draw a square. Shade 1/5 of the square.
   b. Draw a circle. Shade 1/8 of the circle.
   c. Draw a rectangle. Shade 1/6 of the rectangle.
   d. Draw a rectangle. Shade 1/10 of the rectangle.

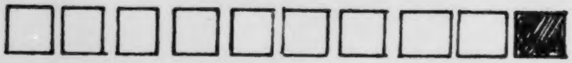
3. Have students complete activities similar to the example below.

What part of each set is shaded? Write the fraction.









CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to identify the parts of a fraction. 3-4 *4

ACTIVITIES

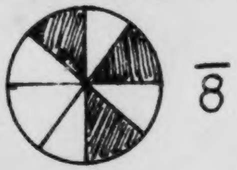
1. Have the students fold a sheet of paper in half and color one-half. Write 1/2 on the chalkboard. Explain that the 2 refers to the number of equal parts and the 1 refers to the number of these parts that are colored. The 1 is called the numerator and the 2 denominator.

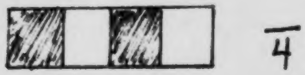
Example:

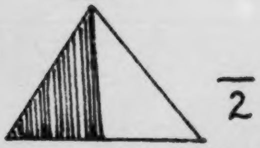
1 → numerator
2 → denominator

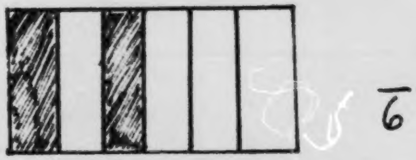
2. Have students supply the missing numerators for the shaded parts.

Example:









3. Have students label each fractional number.

Example:

1	numerator	1	________	1	________	1	________	1	________
2	denominator	5	________	3	________	8	________	10	________

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to write a mixed numeral for the shaded region. 3-5

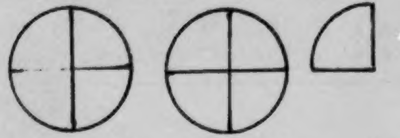
ACTIVITIES

1. Use paper plates to represent melons being sold at the fruit stand. Have students cut the paper plates to show how many fourths in one melon, in two melons, and in three melons. Write the following:

   $1 = \frac{4}{4}$ $2 = \frac{8}{4}$ $3 = \frac{12}{4}$

   Ask students if they can tell without cutting the plates how many fourths in four melons. Repeat with five melons.

2. Have students tell how many fourths in $2\frac{1}{4}$ melons. Use paper plates to illustrate.

   Repeat the activity 2-3/4, 3-1/4, and 3-3/4.

3. Have students use paper plates to show how many thirds in one melon, two melons, and three melons. Write the following:

   $1 = \frac{3}{3}$ $2 = \frac{6}{3}$ $3 = \frac{9}{3}$

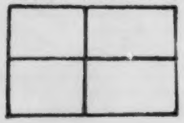
   Have students complete the following using paper plates as necessary.

CONTENT: Fractions and Operations

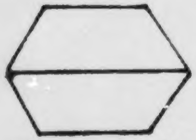
OBJECTIVE: The students will find a fractional part of a whole number using a model. 3-4

ACTIVITIES

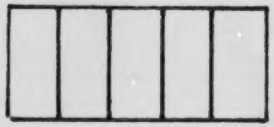
1. Provide models such as the following for students to find the fractional part.



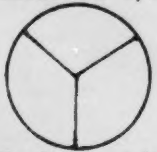
a. Shade in 1/4



b. Shade in 1/2



c. Shade in 2/5



d. Shade in 1/3

2. Have the students bring in recipes of their favorite foods. Have them find the ingredients needed if the recipe was cut in half; in thirds; fourths. They may wish to use a grid to show the amounts.

3. Have the students bring a candy bar or piece of fruit. Ask students to divide their food into halves, fourths, and eighths. Students may want to divide into groups of eight and trade pieces to have an assortment.

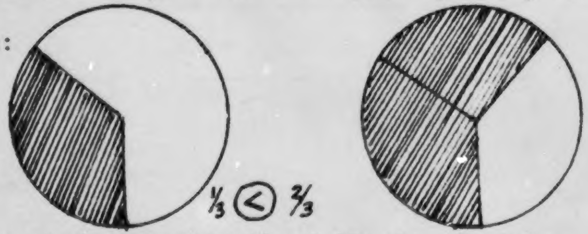
CONTENT: Fractions and Operations

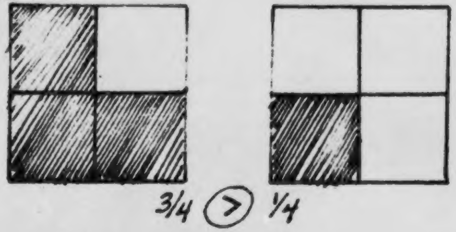
OBJECTIVE: The student will be able to compare fractions with like denominators with the aid of a model. 3-5

ACTIVITIES

1. Have students compare the fractions by using the symbols and .

Example:





2. Have the students write the following fractions on individual cards:

$\frac{1}{2}$, $\frac{1}{3}$, $\frac{2}{3}$, $\frac{1}{4}$, $\frac{3}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{3}{5}$, $\frac{4}{5}$, $\frac{1}{6}$, $\frac{5}{6}$, $\frac{1}{7}$, $\frac{2}{7}$, $\frac{3}{7}$, $\frac{4}{7}$, $\frac{5}{7}$, $\frac{6}{7}$, $\frac{1}{8}$, $\frac{3}{8}$, $\frac{5}{5}$, $\frac{7}{8}$.

Two students may play. Each draws a card. Students find the least common denominator of the two fractions and make them into like fractions. Then they should compare the fractions. The student with the greatest fraction keeps both cards. After all the cards are drawn, the student with more cards is the winner.

3. Have students fold two strips of paper in fourths. Color 1/4 of one and 3/4 of another. Ask which is more, 1 of 4 equal parts or 3 of four equal parts. Ask which fraction shows more, 1/4 or 3/4. Develop the idea that 1/4 3/4.

For students who need a more concrete approach, fractional pieces may be used to form a picture for comparison.

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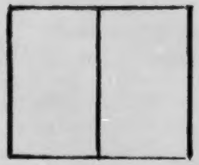
CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to write equivalent fractions working from a model. 3-5

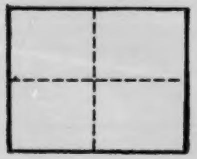
ACTIVITIES

1. Have students fold a sheet of paper in half. Then color one half red and write the fraction.



1/2 is red

Fold the paper again. Write on the chalkboard



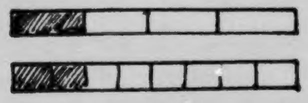
1/2 = 2/4
Continue with 2/4 = 4/8

1/2, 2/4 and 4/8 name the same numbers

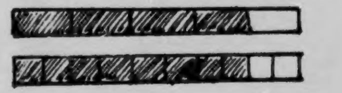
2. Cut out four equal size circles from four colors of construction paper. Cut three of the circles into halves, fourths, and eighths. Have the student use the fraction models to complete the following:

1/2 = ?/4 (2)
2/8 = ?/4 (1)
2/4 = ?/2 (1)
3/4 = ?/8 (6)
2/4 = ?/8 (4)
1/4 = ?/8 (2)
1 = ?/2 (2)
1 = ?/4 (4)
4/8 = ?/4 (2)
1/2 = ?/8 (4)

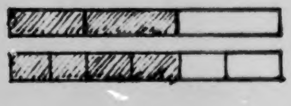
3. Use the model to complete the sentence.



1/4 = ?/8 (2)



4/5 = ?/10 (8)



2/3 = ?/6 (4)

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to identify and write equivalent fractional numbers. 4-6

ACTIVITIES

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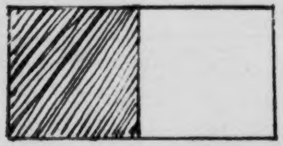
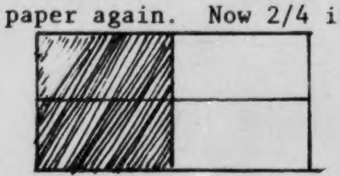
1. To assist students in understanding equivalent fractions, have them fold a paper in half. Color one half.



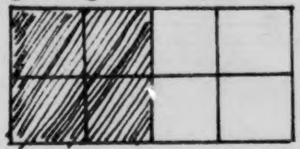
$\frac{1}{2}$ is colored

Fold the paper again. Now 2/4 is colored. Elicit the idea that 1/2 is the same as 2/4.



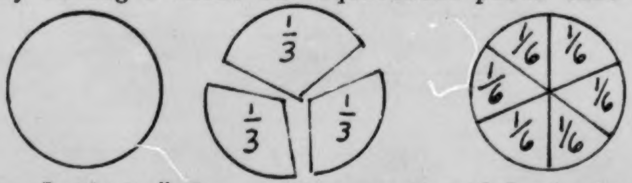
1/2 = 2/4

Fold the paper again. 4/8 is colored.

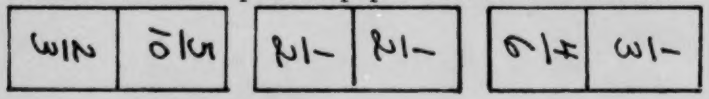


1/2 = 2/4 = 4/8

Have models to demonstrate other equivalents: fifths and tenths, thirds, sixths, and ninths. Models may be made by having a whole and equivalent parts that attach by Velcro to their equivalents.



2. Make "Fraction Dominoes" from poster paper and laminate them. Dominoes contain equivalent fractions.



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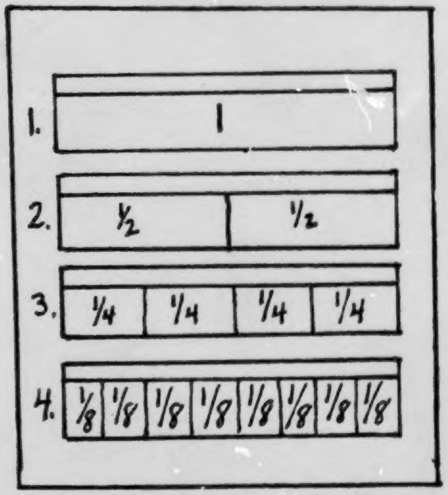
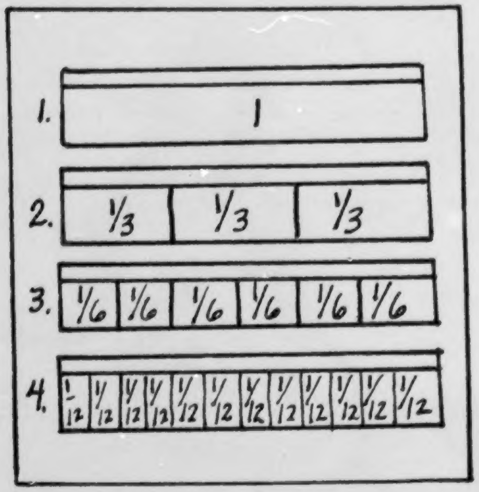
Students play as in regular dominoes, matching equivalent fractions.

3. Make "equivalence tables" to help students see the relationship between fractions. Construct tables by duplicating the pages on construction paper. Make one table for thirds, sixths, and twelfths. Make another one for halves, fourths, and eighths. Following are the duplicating masters.


1. 1
2. 1/2 1/2
3. 1/4 1/4 1/4 1/4
4. 1/8 1/8 1/8 1/8 1/8 1/8 1/8 1/8


1. 1
2. 1/3 1/3 1/3
3. 1/6 1/6 1/6 1/6 1/6 1/6
4. 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12 1/12

Each fraction strip is a page of the tablet. Cut out the strips and staple them together along the top solid edge. When the tablets are compiled in the order shown, cut along the dotted lines to separate the fractional parts. When the dotted lines are cut, each fractional part may be lifted to show its equivalent beneath it.

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to compare fractions using , , and =. 6-8

ACTIVITIES

1. Have students rename the following pairs of fractions with the same denominator, then place the correct symbol (<, >, =) to make the sentences true.

1/2 ○ 1/10 (>)
1/2 ○ 3/6 (=)
5/9 ○ 2/3 (<)
4/5 ○ 7/10 (>)
3½ ○ 7/2 (=)
3-5/8 ○ 27/8 (>)

2/3 ○ 5/6 (<)
3/9 ○ 1/3 (=)
1/4 ○ 3/8 (<)
11/16 ○ 3/4 (<)
4- 7/12 ○ 4½ (>)
6- 7/9 ○ 62/9 (<)

2. Have students find a fraction in simplest form between the two given fractions (answers can vary)

a. 1/2 and 5/6 = 2/3
b. 11/20 and 7/12 = 17/30
c. 4/7 and 2/3 = 13/21
d. 3/5 and 3/4 = 13/20 or 7/10
e. 1/6 and 1/3 = 1/5
f. 3/7 and 4/7 = 1/2
g. 4/5 and 9/10 = 5/6, 6/7, 7/8
h. 13/16 and 7/8 = 5/6

3. Have students arrange fractions from least to greatest and illustrate.

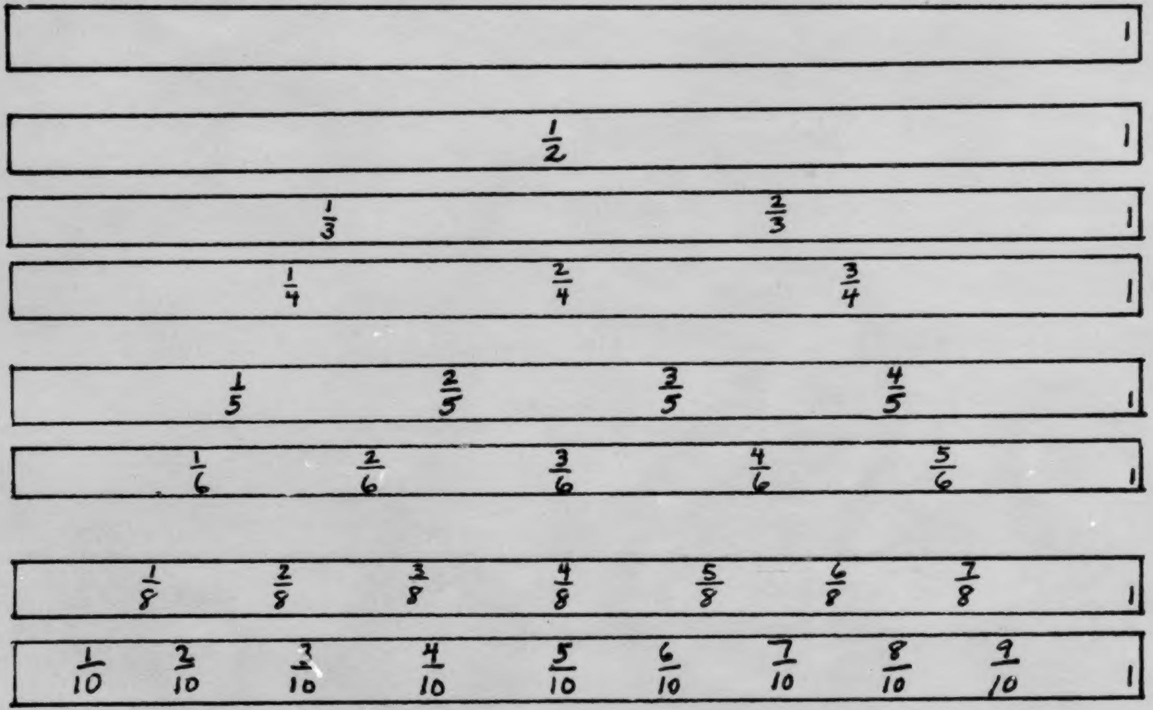
a. 5/11, 2/11, 9/11, 1/11, 4/11, 10/11
b. 2/3, 2/5, 2/9, 2/4, 2/6

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to add two simple fractions with like denominators and no regrouping. 4-5 *5

ACTIVITIES

1. Use a number line to review addition of whole numbers. Make number lines for adding fractions of like denominators. Tape eight pieces of adding machine tape on the board to illustrate a whole, halves, thirds, fourths, fifths, sixths, eighths, and tenths. Put the lines adjacent to each other, showing their relationship to the whole and to other fractions.

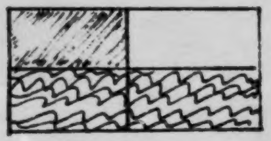

1
1/2 1
1/3 2/3 1
1/4 2/4 3/4 1
1/5 2/5 3/5 4/5 1
1/6 2/6 3/6 4/6 5/6 1
1/8 2/8 3/8 4/8 5/8 6/8 7/8 1
1/10 2/10 3/10 4/10 5/10 6/10 7/10 8/10 9/10 1

Use the lines to illustrate the addition of like fractions. Stress that when adding like fractions, only the numerators are added.

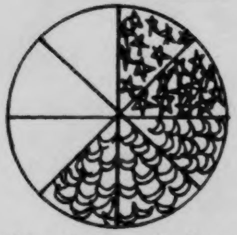
2. Have students draw figures to illustrate finding the sums. Encourage the students to be artistic in designating the parts to be added.

Examples:

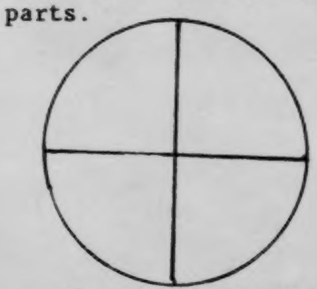
$\frac{1}{4} + \frac{2}{4} = \square$

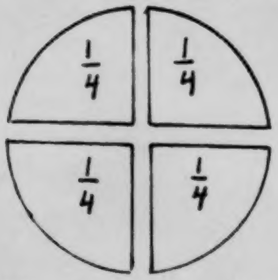


$\frac{2}{8} + \frac{3}{8} = \square$



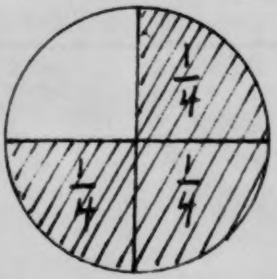
3. Use two paper plates or flannel pieces to illustrate halves, thirds, fourths, fifths, sixths, eights, and tenths. Draw the fractional parts on one plate. Color and cut the other plate into the fractional parts.





Show sums of given problems by placing the cut parts onto the whole. To show 1/4 + 2/4, place one of the fourths on the whole, then two of the fourths on the whole and add:

$\frac{1}{4} + \frac{2}{4} = \boxed{\frac{3}{4}}$



CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to subtract two simple fractions with like denominators and no regrouping. 4-5 *5

ACTIVITIES

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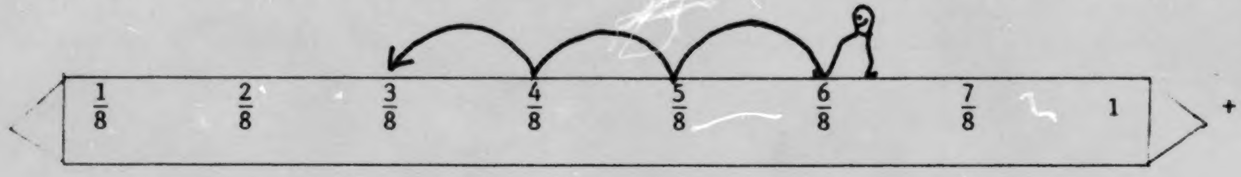
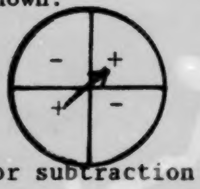
1. Put masking tape number lines on the floor illustrating halves, thirds, fourths, fifths, sixths, eighths, and tenths. Students illustrate subtraction facts by moving on the appropriate number line.



$$\frac{6}{8} - \frac{3}{8} = \boxed{\frac{3}{8}}$$

2. Write pairs of fractions with the same denominators on cards as shown.

$$\boxed{\frac{5}{8}, \quad \frac{1}{8}} \qquad \boxed{\frac{3}{4}, \quad \frac{1}{4}}$$



Students choose a card and then use the spinner to show addition or subtraction and find the answer.

3. Have students make clay or play-dough shaped in square, circular, and rectangular pans. Given subtraction problems, the students demonstrate the subtraction of fractions using the clay shapes. For example, given the problem $\frac{3}{4} - \frac{1}{4} = \square$, the students will look at the denominators to see how many equal parts to cut the shape into. The student represents $\frac{3}{4}$ with three of the four parts and removes one of the four parts to show that two of the four parts are left.

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CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to identify:
(1) a proper fraction.
(2) an improper fraction.
(3) a mixed number.

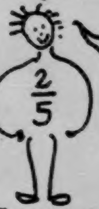
4-9 *9

ACTIVITIES

1. To introduce the terms proper fraction, improper fraction, and mixed fraction, display a poster such as the following:

Don't be fractured by fractions!
Learn the vocabulary!

1. Proper Fractions: $\frac{2}{3}$, $\frac{3}{4}$, $\frac{5}{6}$, $\frac{7}{8}$,



I'm as proper as proper can be. My numerator is less than my denominator. See?

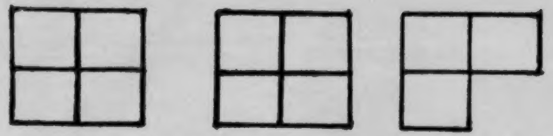
2. Improper fractions: $\frac{9}{2}$, $\frac{5}{3}$, $\frac{8}{4}$, $\frac{10}{10}$

I'm improper. Can you see why? My numerator is much too high. Improper fractions have numerators equal to or greater than their denominators.

3. Mixed Numerals: 1 1/2, 3 3/4, 2 5/8, 3 7/10

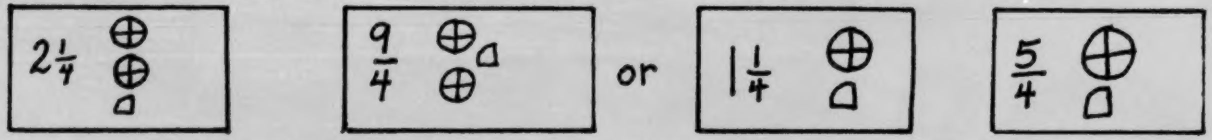
A happy mixture - that's me. I'm a whole number and a fraction you see. Improper fractions can be changed to me.

Illustrate with examples like the following:



Ask: "Which of the three shows a proper fraction?" Have students circle it; write 3/4 and label it proper fraction.
Ask: "How many fourths are there in all?" Have the students count the 11 fourths, write 11/4, and label it improper fraction.
Ask: "Can you write the improper fraction as a whole number?" Help them to see 4/4 as one whole. Write the mixed numeral 2-3/4 and label it.

2. Make a deck of cards containing pairs of improper fractions and the equivalent mixed numerals. Illustrations may be used if needed. Students play as in "Old Maid" matching improper fractions and mixed numerals. A proper fraction may be used for the Old Maid.



3. Give each student four circles. Have them fold the circles into fourths, and then cut them into fourths. Have each student use the fourth to show given improper fractions and their equivalent mixed numbers. Given 15/4, students count out 15 fourths. Then, help them regroup the fourths to make three whole circles with three fourths left over. Write the mixed numeral 3-3/4 to show the result.

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to add mixed numbers having like denominators with no regrouping and no renaming in the sum. 4-5 *5

ACTIVITIES

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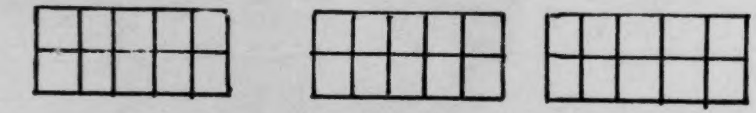
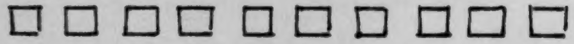
1. Trim three egg cartons to show 10 equal parts.

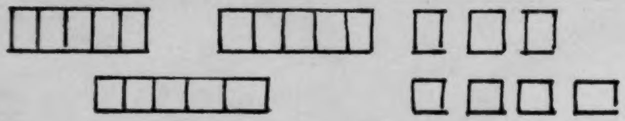


Cut another egg carton into 10 individual cups.



Discuss the fact that the carton is one whole divided into 10 parts. Each cup is one of the 10 parts or 1/10. Three cups would be 3 of the 10 parts or 3/10. Then, use the cartons and cups to illustrate addition of mixed numbers such as the following:

$$\begin{array}{r} 2\frac{3}{10} \\ 1\frac{4}{10} \\ \hline \end{array}$$



Have a volunteer group the whole cartons together, and group the single cups together to get the answer. See if students can suggest a way to find the answer without the cartons. Arrive at the idea of adding the fractions and then the whole numbers.

2. Give students a recipe for "Witches Brew." Have students double the trouble by doubling each ingredient. Simplify results to lowest terms.

Single Portion	Double Portion
$4\frac{3}{8}$ gallons spring water	______________
$1\frac{1}{5}$ cups ground beetles	______________

$2\frac{1}{3}$ teaspoons alligator's tears ____________

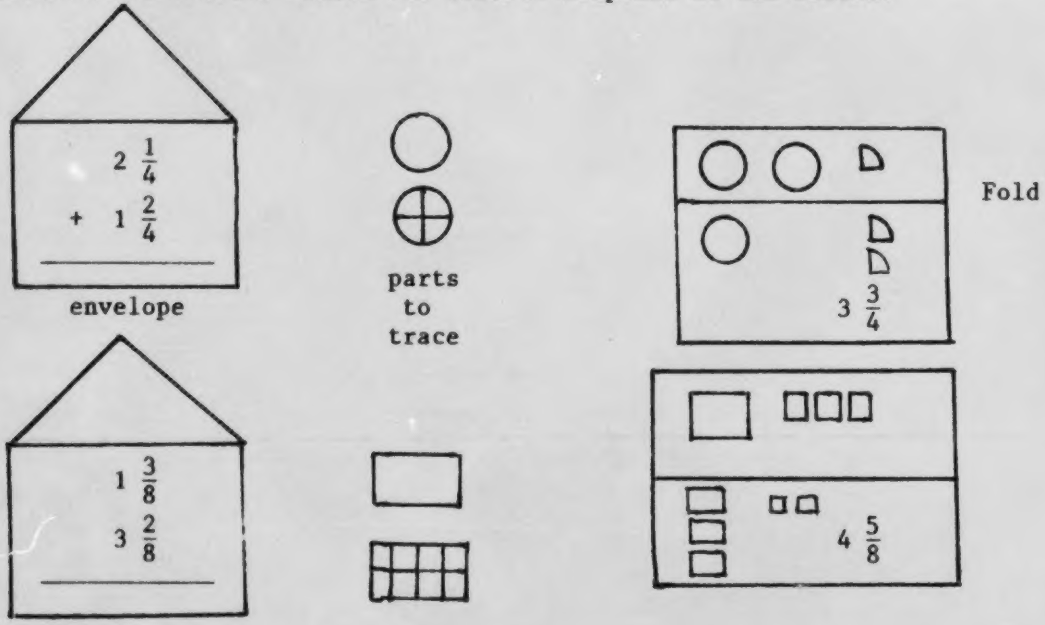
$3\frac{1}{4}$ bat's wings ____________

$6\frac{2}{5}$ monkey's whiskers ____________

$15\frac{1}{4}$ rat's eyeballs ____________

Students may bring in their favorite recipes involving fractions and double or triple them.

3. Give each student a manila envelope with a problem on the outside and fractional parts inside. Fractional parts include a whole and another whole divided into appropriate parts. The student traces the parts on a separate page to show the problem. Show one addend at the top and other addend at the bottom. Write the correct response at the bottom.



$2\frac{1}{4}$
$+ 1\frac{2}{4}$
envelope
parts to trace
$3\frac{3}{4}$
Fold
$1\frac{3}{8}$
$3\frac{2}{8}$
$4\frac{5}{8}$

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to subtract mixed numbers having like denominators with no regrouping and no renaming in the difference. 4-5 *5

ACTIVITIES

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1. The teacher reviews addition of whole numbers - how to add the fractional parts and then add the whole parts. Explain that in subtraction we subtract the fractional parts and then subtract the whole numbers. To illustrate, have two slices of gum or other treat for each student in the class - one whole and one cut in fourths. Display the gum in paper plates illustrating various mixed numbers: 3 3/4, 2 2/4, 5 3/4, etc. A student comes up, subtracts 1¼ slices and writes the resulting problem on the board:

$$\begin{array}{r} 3\,\frac{3}{4} \\ -\;1\,\frac{1}{4} \\ \hline 2\,\frac{2}{4} \end{array}$$

   If the problem is done correctly, he chews the gum and calls on someone else to do another problem. Continue until the process is understood. Distribute the rest of the gum so that everyone has 1¼ pieces.

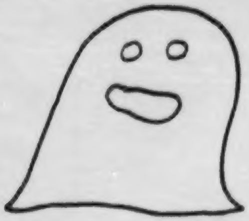
2. Put subtraction problems on twenty 3" x 5" cards, all with like denominators:

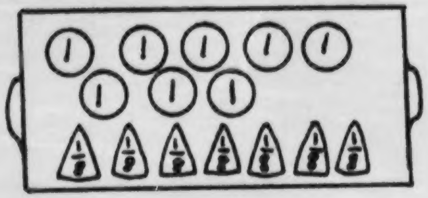
$$\boxed{\begin{array}{r} 5\,\frac{3}{10} \\ -\;2\,\frac{2}{10} \\ \hline \end{array}} \qquad \boxed{\begin{array}{r} 5\,\frac{8}{10} \\ -\;3\,\frac{1}{10} \\ \hline \end{array}} \qquad \boxed{\begin{array}{r} 9\,\frac{8}{10} \\ -\;\frac{5}{10} \\ \hline \end{array}} \qquad \boxed{\begin{array}{r} 2\,\frac{7}{10} \\ -\;1\,\frac{3}{10} \\ \hline \end{array}} \qquad \boxed{\begin{array}{r} 6\,\frac{8}{10} \\ -\;4\,\frac{1}{10} \\ \hline \end{array}}$$

   Two students play battle using the cards. Each turns up a card, subtracts silently. The one with the largest mixed numeral remaining wins the cards.

3. Construct a "cookie monster" out of a large paper bag. Cut a large hole for the mouth. Make an assortment of cookies (wholes, halves, fourths, eighths, thirds, sixths, etc.) from poster paper and label each one. Given subtraction problems, students show the numbers in the minuend by placing cookies on a tray. Subtraction is shown by feeding numbers in the subtrahend to the cookie monster. The number left on the tray is the difference.

$$\begin{array}{rr} & 5\frac{7}{8} \\ - & 2\frac{3}{8} \\ \hline \end{array}$$




1
1
1
1
1
1
1
1
$\frac{1}{8}$
$\frac{1}{8}$
$\frac{1}{8}$
$\frac{1}{8}$
$\frac{1}{8}$
$\frac{1}{8}$
$\frac{1}{8}$

Tray

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to find fractional parts of a whole number. 4-6

ACTIVITIES

1. Review the meaning of fractions. Remind students that the denominator tells how many parts the whole is divided into while the numerator tells how many of those parts have a certain characteristic. Use students to demonstrate finding fractional parts of a group: Example: Call six students to the front of the room. Lead the class in putting funny hats on 2/3 of the students. Look at the denominator to see how many equal groups to divide 6 into. (3) How many of those 3 groups will get hats? (2) How many students are in the two groups? (4) 2/3 of 6 is 4. Following the same process, using other students to do the following:

   a. Put crepe paper bows on 1/3 of 9 students.
   b. Give balloons to 3/4 of 12 students.
   c. Put mustaches on 1/4 of 8 students.
   d. Put freckles on 3/5 of 10 students.
   e. Put wigs on 1/3 of 6 students.

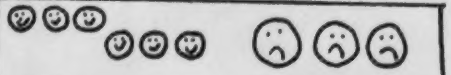
2. Give students a number of ovals. Have students make faces and mount them on sheets of construction paper according to the following directions:

   a. Put happy faces on 2/3 of 9.
   b. Put yarn pigtails on 3/4 of 8.
   c. Put funny hats on 1/3 of 6.
   d. Put clown faces on 1/2 of 10.
   e. Put men's faces on 2/5 of 10.
   f. Put bald heads on 1/2 of 4.
   g. Put curly hair on 1/5 of 5.
   h. Put blue eyes on 1/4 of 8.

3. Use counters to demonstrate the following:

   1/5 of 10 = _____
   1/3 of 18 = _____
   1/2 of 8 = _____
   1/6 of 12 = _____
   1/8 of 16 = _____
   1/4 of 8 = _____
   1/3 of 12 = _____
   1/4 of 12 = _____

   Use the faces designed in activity 2 to find the respective fractional parts.



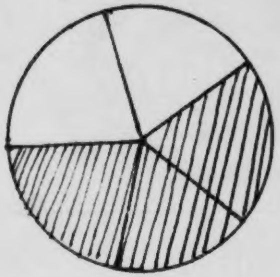
2/3 of 9 have happy faces.
2/3 of 9 is ______.

CONTENT: Fractions and Operations

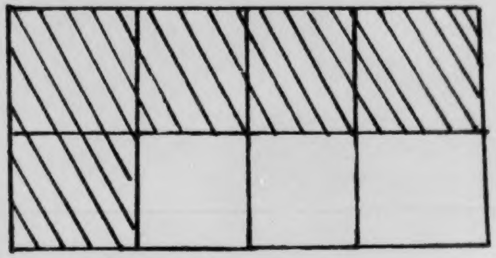
OBJECTIVE: The student will be able to identify the common fraction that represents the shaded area of a grid figure when compared to the total area: (2/5, 3/5, 3/8, 5/8, 7/8). 5-7 *7

ACTIVITIES

1. Write a fraction for the shaded part of each drawing:



3/5



5/8

2. Complete the following statements:

   8 birds - 7 are flying. What part is flying?

   5 eggs - 2 are broken. What part is broken?

3. Make a set of fraction flash cards. One side shows a region that is partly shaded; the reverse side shows the related fractional number.

CONTENT: Fractions and Operations

OBJECTIVE: The students will be able to continue consecutive equivalency pattern of fractions: (1/2, 2/4, 3/6, 4/8....) 5-6 *6

ACTIVITIES

1. Give equivalent fractions. Use the same denominator for each pair.

1/2 = 2/3 = 1/4 = 4/5 =

1/3 = 5/8 = 2/3 = 2/5 =

3/4 = 1/3 = 3/10 = 5/6 =

2. Have students build equivalent fraction strips. The students must name 9 more fractions equivalent to a given fraction.

1/2

2/4

3/6

4/8

3. List the multiples of each number 1-12. You can then find the equivalent fraction. Example: Find 1/4 and trace across the equivalents 2/8, 3/12.....

1 2 3 4 5 6 7 8 9 10 11 12

2 4 6 8 10 12 14 16 18 20 22 24

4 8 12 16 20 .....

5.....

6

7

8

9

10

11

12

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to determine the Greatest Common Factor (GCF) of numbers. 5-7 *7

ACTIVITIES

1. A simple approach to naming the Greatest Common Factor of two or more numbers is to name the set of all factors of each number, determine the set of common factors, and finally name the Greatest Common Factor.

   For example, you may ask the students to find the GCF of 28 and 70. First form the set of all factors or divisors of 28 and 70.

   28 (1, 2, 4, 7, 14, 28)

   70 (1, 2, 5, 7, 10, 14, 35, 70)

   The common factors of 28 and 70 may then be determined (1, 2, 7, 14). Fourteen is the greatest of these common factors. Hence, 14 is the Greatest Common Factor of 28 and 70.

   Have the students find the GCF for numbers such as these:

   9 and 15
   27 and 18
   16 and 28
   60 and 45
   102 and 180
   12 and 20
   36 and 42
   21 and 56
   99 and 132

2. Demonstrate this method of finding the GCF and LCM.

   Find the GCF and LCM of 28 and 70.

   A. Choose any divisor of 28 and 70 (largest one preferably).

   B. See if another divisor will divide the new numbers.

   C. Stop when the numbers on the top (quotients) only have 1 as a common factor.

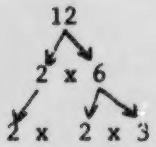
$$\begin{array}{r|ll} & 2 & 5 \\ \hline 7 & 14 & 35 \\ \hline 2 & 28 & 70 \end{array}$$

D. The product of the divisors is the GCF (2 x 7 = 14; 14 is the GCF).

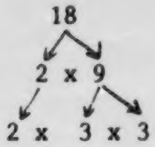
E. The GCF times the product of the top two numbers (quotients) is the LCM - 14 x (2 x 5) = 140.

3. Show the students how to find GCF by using factor trees. Once the prime factors are known, they can be used to determine the GCF.

Example:



and



Show them that the GCF is the product of the common factors or 2 x 3 = 6.

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to find the simplest form of a fractional number. 5-7 *7

ACTIVITIES

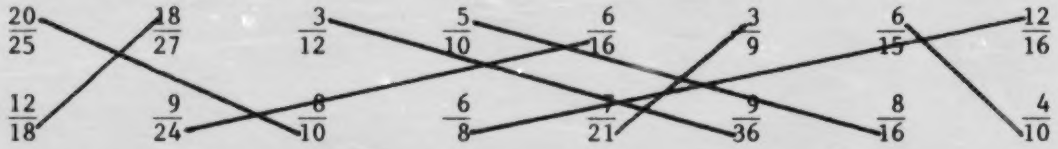
1. Write fractions such as those shown below on cards. Students draw the cards one at a time, and each student finds the simplest form. The first to find the correct simplest form scores one point. This may be played by two students, two teams, or a whole class.

$\frac{10}{12} = \underline{\frac{5}{6}}$ $\frac{8}{10} = \underline{\frac{4}{5}}$ $\frac{6}{8} = \underline{\frac{3}{4}}$ $\frac{6}{9} = \underline{\frac{2}{3}}$

$\frac{12}{15} = \underline{\frac{4}{5}}$ $\frac{9}{12} = \underline{\frac{3}{4}}$ $\frac{5}{15} = \underline{\frac{1}{3}}$ $\frac{5}{10} = \underline{\frac{1}{2}}$

$\frac{4}{16} = \underline{\frac{1}{4}}$ $\frac{10}{30} = \underline{\frac{1}{3}}$ $\frac{12}{16} = \underline{\frac{3}{4}}$ $\frac{10}{25} = \underline{\frac{2}{5}}$

2. Have students match the fractions that have the same simplest form.



3 Have students list the factors of the numbers 2 through 32. Let them refer to this list as often as necessary to find the Greatest Common Factor for the following pairs of numbers.

15 and 24 (3) 20 and 32 (4) 24 and 28 (4) 18 and 27 (9)

Then show them how to use the GCF to reduce the fractions to lowest terms.

$\frac{15}{24}$ $\frac{5}{8}$ $\frac{24}{28}$ $\frac{6}{7}$ $\frac{20}{32}$ $\frac{5}{[illegible]}$ $\frac{18}{27}$ $\frac{2}{3}$

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to rename fractions in higher terms. 5-7 *7

ACTIVITIES

1. Have students complete examples in which they multiply the numerator and denominator of a fraction by the same number to write an equal fraction in higher terms.

$$\frac{4}{6} = \frac{4 \times 2}{6 \times 2} = \frac{8}{12} \qquad \frac{3}{9} = \frac{3 \times 2}{9 \times 2} = \frac{6}{18}$$

Explain to students that a fraction is in lowest terms when there is no number other than 1 that will divide its numerator and denominator evenly.

Equal Fraction Dominoes

a.	1/2 15/21	12/16 7/8	35/40 5/10	18/24 14/16	9/18 25/35	5/7 3/4

b. Place all dominoes face down on a table. Each player draws four dominoes.

c. The first player places a domino in the center.

d. The next player matches one of the fractions on the first domino with an equal fraction.

e. If you cannot play, draw another domino, and the play passes on. The player who uses all his or her dominoes is the winner.

2. Divide the class into teams. Write a lowest term fraction on the chalkboard. Set a time limit. One member from each team will race to the board, write a higher term fraction and return to his seat. The next person on each team will race to the board and so forth until the specified time is up. Each team scores one point for each correct answer.

3. Give the students practice in paper folding. Have students fold a square of paper in half and color one half. Have them write the fractions on their paper as the folding continues. (1/2) Fold in half again and write the resulting fraction (2/4). Continue this procedure through sixteenths. Discuss how the color section did not change with folding.

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to rename mixed numbers and/or whole numbers as improper fractions. 5-7 *7

ACTIVITIES

1. Let pairs of students write fractions for mixed numbers. Write 12 mixed numerals on separate cards. Stack the cards face down between two students. Students draw the cards one at a time, and each writes the fraction for the mixed numeral. The first to write the correct fraction keeps the card. The student who earns the most cards is the winner.

2. Have the students write a fraction for the mixed numeral, then write or .

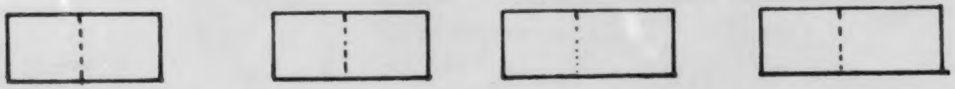
$\frac{26}{5} > 4\frac{2}{5}$	$\frac{22}{5}$	$\frac{17}{6} > 2\frac{1}{6}$	$\frac{13}{6}$
$\frac{18}{4} < 4\frac{3}{4}$	$\frac{19}{4}$	$\frac{17}{3} > 4\frac{2}{3}$	$\frac{14}{3}$
$\frac{35}{8} > 3\frac{7}{8}$	$\frac{31}{8}$	$\frac{38}{8} < 5\frac{1}{8}$	$\frac{41}{8}$
$\frac{11}{3} < 5\frac{1}{3}$	$\frac{16}{3}$	$\frac{18}{5} < 4\frac{3}{5}$	$\frac{23}{5}$

3. Reproduce fraction drawings and directions similar to the one shown below. For this drawing give the students the directions:

   a. Color 3½ blue.

   b. Count the blue ½'s.

   c. Write the mixed numeral and the improper fraction (3½ = 7/2).



CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to rename improper fractions as mixed numbers and/or whole numbers. 5-7 *7

ACTIVITIES

1. Make a 3" x 4" grid. Write mixed numerals in the sections of the grid. Write corresponding fractions on cards. Have the students place each fraction card on the corresponding mixed numeral on the grid.

$5\frac{1}{3}$	$1\frac{5}{6}$	$4\frac{4}{5}$	$1\frac{7}{8}$
$1\frac{3}{8}$	$2\frac{2}{3}$	$6\frac{1}{2}$	$5\frac{1}{2}$
$1\frac{1}{2}$	$2\frac{2}{5}$	$3\frac{1}{3}$	$2\frac{2}{3}$

$\frac{12}{5}$	$\frac{15}{8}$	$\frac{13}{2}$	$\frac{11}{6}$
$\frac{5}{3}$	$\frac{16}{3}$	$\frac{10}{3}$	$\frac{3}{2}$
$\frac{24}{5}$	$\frac{8}{3}$	$\frac{11}{2}$	$\frac{11}{8}$

2. Have the students find the number of months in the following:

$\frac{1}{3}$ year = 4

$\frac{1}{6}$ year = 2

$\frac{1}{4}$ year = 3

$1\frac{1}{2}$ year = 18

$\frac{3}{4}$ year = 9

$1\frac{1}{4}$ year = 15

$2\frac{1}{2}$ year = 30

$\frac{5}{6}$ year = 10

$\frac{11}{6}$ year = _22_ $1\frac{1}{3}$ year = _16_

$2\frac{1}{6}$ year = _26_ $\frac{5}{3}$ = _20_

3. Have students count by ones, using fractions. For example:

$$\frac{2}{2}, \frac{4}{2}, \frac{6}{2}, \frac{8}{2}, \ldots \quad \text{or} \quad \frac{5}{5}, \frac{10}{5}, \frac{15}{5}, \frac{20}{5}, \ldots$$

Show them how to set up simple division problems to change improper fractions to mixed numbers.

$$\frac{7}{5} \longrightarrow \begin{array}{r} 1\ r\ 2 \\ 5\overline{)7} \\ \underline{5} \\ 2 \end{array} = 1\frac{2}{5} \qquad \frac{7}{2} \longrightarrow \begin{array}{r} 3\ r\ 1 \\ 2\overline{)7} \\ \underline{6} \\ 1 \end{array} = 3\frac{1}{2}$$

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to determine the Least Common Multiple (LCM) of two or more numbers.

5-7 *7

ACTIVITIES

1. Give students some practice in finding the Least Common Multiple by "trial and error" before introducing the factorization method.

   Have students find the LCM of 6 and 8. First they should list part of the set of

   multiples of 6: (6, 12, 18, 24, 30, 36, 42...)
   and
   multiples of 8: (8, 16, 24, 32, 40, 48....)

   Then have them identify the least number that appears in both sets. Twenty-four is the LCM.

2. Have the students find the LCM of the numbers. Write the letter in the box above the answer.

   E: 4 and 6
   Y: 15 and 40
   T: 14 and 21
   O: 8 and 18
   C: 7 and 8
   L: 12 and 20
   M: 48 and 56
   R: 21 and 35

M	O	T	O	R	C	Y	C	L	E
336	72	42	72	105	56	120	56	60	12

3. Help the students complete a cross-number puzzle by finding the LCM of the numbers.

Across	Down
1. 5 and 7	1. 3 and 13
2. 12 and 32	2. 8 and 56

^{1} 3	^{2} 5
^{3} 9	6

As a variation to this activity, students may also be allowed to develop their own short puzzles and exchange them with each other.

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to rename fractions with unlike denominators to fractions with like denominators. 5-7 *7

ACTIVITIES

1. Rename: 1/4 and 5/6 as like fractions.

Think, "The least common multiple of 4 and 6 is 12." The least common denominator of 1/4 and 5/6 is 12.

Example: $\begin{array}{r} 3 \\ 4\overline{)12} \end{array}$ $\frac{1 \times 3 = 3}{4 \times 3 = 12}$; $\begin{array}{r} 2 \\ 6\overline{)12} \end{array}$ $\frac{5 \times 2 = 10}{6 \times 2 = 12}$

Therefore: 1/4 = 3/12 and 5/6 = 10/12

Rename the following like fractions.

a. 1/2, 1/8 b. /4, 1/3 c. 3/4, 1/6 d. 1/4, 3/8, 4/5

2. Rename the following as like fractions.

a. 6/7, 3/4, 1/2 c. 5/8, 2/3, 4/5 e. 6/10, 1/3, 3/4
b. 4/9, 1/2, 5/6 d. 7/12, 1/8, 1/4 f. 3/4, 5/6, 1/5

3. Reinforcement approach: use the following chart.

Unlike Fractions	Find L.C.D.	Find Name Change	Rename
2/3	2/3 = n/12	12 ÷ 3 = 4	$\frac{2 \times 4 =}{3 \times 4 =}\ \frac{8}{12}$
3/4	3/4 = n/12	12 ÷ 4 = 3	$\frac{3 \times 3 =}{4 \times 3}\ \frac{9}{12}$

CONTENT: Fractions and Operations

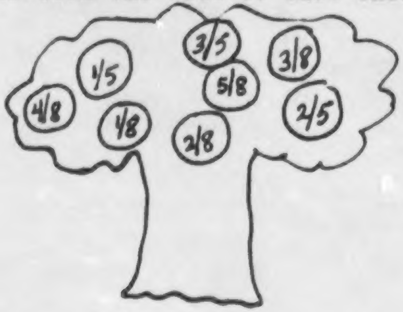
OBJECTIVE: The student will be able to add fractions with like denominators, renaming sums. 5-7 *7

ACTIVITIES

1. Write the answers in simplest form.

a. $\begin{array}{r} 2/10 \\ +\ \underline{3/10} \\ 5/10 \end{array} = 1/2$ b. $\begin{array}{r} 1/8 \\ +\ \underline{5/8} \\ 6/8 \end{array} = 3/4$ c. $\begin{array}{r} 4/12 \\ +\ \underline{2/12} \\ 6/12 \end{array} = 1/2$ d. $\begin{array}{r} 1/4 \\ +\ \underline{3/4} \\ 4/4 \end{array} = 1$

2. Pick two fractions from the tree so that their sum is equal to the fraction given.



a. 3/5 = (1/5 + 2/5) c. 4/5 = (3/5 + 1/5)

b. 7/8 = (3/8 + 4/8) d. 3/8 = (1/8 + 2/8)

3. Find the sum:

a. $2/5 + 1/5 = \frac{2 + 1}{5} = 3/5$

b. $2/3 + 4/3 = \frac{2 + 4}{3} = 6/3 = 2$

c. $7/4 + 2/4 = \frac{7 + 2}{4} = 9/4 = 2\frac{1}{4}$

929

928

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to add fractions with unlike denominators. 5-7 *7

ACTIVITIES

1. Write pairs of numerals (denominators) on several cards, e.g., 12, 8 5, 3. Divide the class into teams. Let one student from each team go to the chalkboard. Show the students one of the cards and let them race to find the least common multiple of the numbers shown. The first one to finish scores a point for his team.

2. Use the cards suggested in Activity 1. Let the students play Travel to see who can remain standing the longest.

3. Give the students problems such as 3/4 + 5/6 = n/24. Have them find the equivalent fractions for 3/4 and 5/6 and the resulting sum.

930

931

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to subtract fractions with like denominators, renaming differences. 5-7 *7

ACTIVITIES

1. Write the answers in simplest form.

   a. $\begin{array}{r} 5/6 \\ \underline{-1/6} \\ 4/6 \end{array} = 2/3$ b. $\begin{array}{r} 5/6 \\ \underline{-2/6} \\ 3/6 \end{array} = 1/2$ c. $\begin{array}{r} 7/8 \\ \underline{-3/8} \\ 4/8 \end{array} = 1/2$ d. $\begin{array}{r} 5/8 \\ \underline{-3/8} \\ 2/8 \end{array} = 1/4$

2. Take a class poll to find out if students like apple pie. Have students solve the following problems related to the pie.

   a. 7/8 pie. Jean eats 3/8. How much is left? (1/2)

   b. 5/8 pie. Sue eats 2/8. How much is left? (3/8)

   c. 4/8 pie. 2/8 is heated. How much is cold? (1/4)

   d. 8/8 pie. 6/8 is taken to school. How much is left? (1/4)

3. Complete the following problems and write answers in simplest form.

   a. $5/6 - 2/6 = \frac{5-2}{6} = \frac{3}{6} = \frac{1}{2}$

   b. $8/15 - 3/15 = \frac{8-3}{15} = \frac{5}{15} = \frac{1}{3}$

   c. $9/10 - 5/10 = \frac{9-5}{10} = \frac{4}{10} = \frac{2}{5}$

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to add numbers involving fractions and mixed numerals. 5-7 *7

ACTIVITIES

1. Have students add and ring the greater sum for each pair.

a. $\frac{1}{4} + \frac{2}{3} = \boxed{\frac{11}{12}}$
$\frac{1}{6} + \frac{1}{4} = \frac{5}{12}$

b. $\frac{2}{5} + \frac{1}{15} = \frac{7}{15}$
$\frac{1}{3} + \frac{3}{15} = \boxed{\frac{8}{15}}$

c. $\frac{3}{16} + \frac{3}{4} = \boxed{\frac{15}{16}}$
$\frac{1}{16} + \frac{5}{8} = \frac{11}{16}$

d. $\frac{2}{6} + \frac{5}{9} = \frac{16}{18}$
$\frac{1}{2} + \frac{4}{9} = \boxed{\frac{17}{18}}$

e. $4\frac{3}{4} + 2\frac{5}{6} = \boxed{7\frac{7}{12}}$
$7\frac{2}{3} + 3\frac{3}{4} = 7\frac{5}{12}$

f. $5\frac{1}{2} + 6\frac{2}{3} = 12\frac{1}{6}$
$3\frac{5}{6} + 8\frac{1}{2} = \boxed{12\frac{1}{3}}$

g. $3\frac{5}{8} + 2\frac{1}{4} = 5\frac{7}{8}$
$2\frac{3}{8} + 3\frac{3}{4} = \boxed{6\frac{1}{8}}$

h. $4\frac{1}{2} + 5\frac{3}{4} = 10\frac{1}{4}$
$7\frac{5}{6} + 2\frac{2}{3} = \boxed{10\frac{1}{2}}$

2. Have students write the next three terms in each sequence.

a. $5,\ 5\frac{1}{9},\ 5\frac{1}{3},\ 5\frac{2}{3},\ 6\frac{1}{9},\ 6\frac{2}{3},\ 7\frac{1}{3}$ . . . . $\underline{8\frac{1}{9},\ 9,\ 10}$

b. $\frac{1}{4},\ \frac{3}{8},\ \frac{5}{8},\ 1,\ 1\frac{5}{8},\ 2\frac{5}{8},\ 4\frac{1}{4}$ . . . . . $\underline{6\frac{7}{8},\ 11\frac{1}{8},\ 18}$

3. Let pairs of students use fraction cards to practice renaming fractions on separate cards:

$\frac{1}{2},\ \frac{1}{3},\ \frac{2}{3},\ \frac{1}{4},\ \frac{3}{4},\ \frac{1}{5},\ \frac{2}{5},\ \frac{3}{5},\ \frac{1}{6},\ \frac{5}{6},\ \frac{2}{7},\ \frac{3}{7},\ \frac{4}{7},\ \frac{3}{8},\ \frac{5}{8},\ \frac{7}{8}$

Stack face down between two students. Each student draws a card. Students find the least common denominator and rename either one or both fractions. This may also be played in teams.

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to subtract fractions with unlike denominators. 5-7 *7

ACTIVITIES

NOTE: To subtract, denominators must be the same. Sometimes we need to rewrite a fraction before we can subtract.

1. Each of the two blocks below is divided into 18 boxes. Boxes in the top block contain problems and boxes in the bottom block contain the answers. Work any problem and find your answer in the bottom block. Then write the work from the problem box into the answer box. Keep doing problems and you will spell out a funny saying.

FIND A MATCH

$\frac{5}{8} - \frac{1}{2}$ The	$\frac{5}{6} - \frac{1}{3}$ A	$\frac{3}{4} - \frac{1}{12}$ Twice	$\frac{4}{5} - \frac{2}{3}$ As	$\frac{13}{10} - \frac{2}{5}$ Is	$\frac{3}{4} - \frac{1}{3}$ Who
$\frac{7}{8} - \frac{1}{6}$ A	$\frac{3}{2} - \frac{5}{9}$ Ocean	$\frac{3}{5} - \frac{1}{4}$ Bath	$\frac{17}{12} - \frac{5}{6}$ Sailor	$\frac{13}{9} - \frac{2}{3}$ A	$\frac{7}{6} - \frac{5}{9}$ Taking
$\frac{4}{3} - \frac{3}{8}$ Known	$\frac{7}{15} - \frac{1}{6}$ Double	$\frac{9}{10} - \frac{5}{6}$ Crosses	$\frac{9}{8} - \frac{7}{12}$ Crosser	$\frac{7}{9} - \frac{1}{4}$ Without	$\frac{4}{5} - \frac{1}{6}$ Dirty

$\frac{17}{24}$ A	$\frac{7}{12}$ Sailor	$\frac{5}{12}$ Who	$\frac{1}{15}$ Crosses	$\frac{1}{8}$ The	$\frac{17}{18}$ Ocean
$\frac{2}{3}$ Twice	$\frac{19}{36}$ Without	$\frac{11}{18}$ Taking	$\frac{1}{2}$ A	$\frac{7}{20}$ Bath	$\frac{9}{10}$ Is
$\frac{23}{24}$ Known	$\frac{2}{15}$ As	$\frac{7}{9}$ A	$\frac{19}{30}$ Dirty	$\frac{3}{10}$ Double	$\frac{13}{24}$ Crosser

2. Complete. Supply the missing numeral:

a. $$\begin{array}{r} \frac{5}{8} \\ - \frac{n}{16} \\ \hline \frac{3}{16} \end{array}$$ (7)

b. $$\begin{array}{r} \frac{3}{4} \\ - \frac{n}{24} \\ \hline \frac{7}{24} \end{array}$$ (11)

c. $$\begin{array}{r} \frac{1}{2} \\ - \frac{n}{n} \\ \hline \frac{1}{4} \end{array}$$ (¼)

d. $$\begin{array}{r} \frac{3}{5} \\ - \frac{n}{n} \\ \hline \frac{2}{15} \end{array}$$ (7/15)

3. Subtract. Write the answer in simplest form. Have students describe the first step in each.

a. $$\begin{array}{rcr} 3/5 & = & 6/10 \\ - 3/10 & = & 3/10 \\ \cline{3-3} & & 3/10 \end{array}$$

b. $$\begin{array}{r} 3/10 \\ - 1/5 \\ \hline 1/10 \end{array}$$

c. $$\begin{array}{r} 7/10 \\ - 3/5 \\ \hline 1/10 \end{array}$$

d. $$\begin{array}{r} 9/10 \\ - 2/10 \\ \hline 7/10 \end{array}$$

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to subtract a fraction from a whole number. 5-7 *7

ACTIVITIES

Before we subtract a fraction from a whole number, write the whole number as a fraction.

6 = 5-3/3
-1/3 = -1/3
(5-2/3)

Show students that by taking 1 from 6 and renaming it to a fraction, the result is 5-3/3.

1. Complete the following exercises:

a. 4
- 7/8
(3-1/8)

b. 3
- 1/4
(2-3/4)

c. 3
- 3/5
(2-2/5)

2. Vance divided one of eight chunks of sod into three pieces and used two of them to fill holes in the lawn. How many chunks of sod remained to be used? (7-1/3)

3. Complete the following exercise.

a. 6
- 1/3
(5-2/3)

b. 6
- 2/3
(5-1/3)

c. 5
- 2/3
(4-1/3)

d. 5
- 3/8
(4-5/8)

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to:

(1) subtract mixed numbers with like denominators with regrouping. 5-8 *8
(2) subtract mixed numbers with unlike denominators with regrouping. 5-8 *8

ACTIVITIES

1. Have students identify the least common denominator for each subtraction problem and then complete the problems.

a.

$$\begin{array}{rcrcr} 6\frac{3}{8} & = & 6\frac{3}{8} & = & 5\frac{11}{8} \\ \underline{-2\frac{1}{2}} & = & \underline{2\frac{4}{8}} & = & \underline{2\frac{4}{8}} \\ & & & & (3\frac{7}{8}) \end{array}$$

b.

$$\begin{array}{r} 8\frac{1}{4} \\ \underline{-5\frac{1}{3}} \\ (2\frac{11}{12}) \end{array}$$

c.

$$\begin{array}{r} 18\frac{7}{10} \\ \underline{-12\frac{9}{10}} \end{array}$$

d.

$$\begin{array}{rcr} 7\frac{1}{5} & = & 6\frac{6}{5} \\ \underline{-4\frac{4}{5}} & = & \underline{4\frac{4}{5}} \end{array}$$

2. Riddle Math

The answer to this riddle is written in code at the bottom of the next page. To crack the code: Work any problem shown and find your answer in the code. Each time the answer appears in the code, write the letter of that problem above it. Keep working until you discover the answer to the riddle.

RIDDLE MATH

The thing you will know
When you crack this code
Is why the chicken stopped
In the middle of the road.

c $10\frac{1}{2}$ $- 3\frac{1}{4}$	n $9\frac{5}{8}$ $- 4\frac{1}{2}$	h $6\frac{2}{3}$ $- 2\frac{1}{4}$	b $9\frac{4}{5}$ $- 7\frac{2}{3}$	u $5\frac{5}{6}$ $- 1\frac{1}{8}$
y $12\frac{3}{4}$ $- 5\frac{3}{10}$	s $11\frac{5}{8}$ $- 6\frac{1}{4}$	d $9\frac{7}{12}$ $- 5\frac{3}{8}$	w $16\frac{5}{6}$ $- 8\frac{1}{9}$	a $8\frac{4}{15}$ $- 6\frac{1}{6}$
t $11\frac{3}{4}$ $- 10\frac{5}{12}$	o $9\frac{19}{20}$ $- 1\frac{1}{5}$	i $14\frac{9}{10}$ $- 12\frac{5}{6}$	e $11\frac{7}{10}$ $- 9\frac{1}{3}$	l $15\frac{3}{4}$ $- 8\frac{4}{9}$

CODED ANSWER

BECAUSE SHE WANTED

$2\frac{3}{15}$ $2\frac{11}{30}$ $7\frac{1}{4}$ $2\frac{1}{10}$ $4\frac{17}{24}$ $5\frac{3}{8}$ $2\frac{11}{30}$ $5\frac{3}{8}$ $4\frac{5}{12}$ $2\frac{11}{30}$ $8\frac{13}{18}$ $2\frac{1}{10}$ $5\frac{1}{9}$ $8\frac{1}{3}$ $2\frac{11}{30}$ $4\frac{5}{24}$

TO LAY IT ON THE LINE

$8\frac{1}{3}$ $8\frac{3}{4}$ $7\frac{11}{36}$ $2\frac{1}{10}$ $7\frac{9}{20}$ $2\frac{1}{15}$ $8\frac{1}{3}$ $8\frac{3}{4}$ $5\frac{1}{8}$ $8\frac{1}{3}$ $4\frac{5}{12}$ $2\frac{11}{30}$ $7\frac{11}{36}$ $2\frac{1}{15}$ $5\frac{1}{9}$ $2\frac{11}{30}$

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to subtract fractions and mixed numbers 5-8

ACTIVITIES

1. Write the following mixed numbers and fractions in the selection of a spinner:

$10\frac{1}{6}$ $8\frac{2}{3}$ $5\frac{3}{4}$ $4\frac{2}{3}$ $2\frac{5}{6}$ $\frac{7}{8}$ $\frac{11}{12}$ $\frac{15}{16}$

Let four students use the spinner. In each round of a game, each player spins twice and subtracts the lesser number from the greater number. Other players subtract to check. The first player scores a point if he or she subtracts correctly.

2. Have students solve the following:

a. $X - 2\frac{5}{6} = 7\frac{7}{10}$ $\underline{10\frac{8}{15}}$ b. $a + 8\frac{1}{2} = 10\frac{4}{11}$ $\underline{1\frac{19}{22}}$ c. $1\frac{3}{7} + c = 5\frac{1}{4}$ $\underline{3\frac{23}{28}}$

d. $3\frac{17}{36} + y = 4\frac{2}{9}$ $\underline{\frac{3}{4}}$ e. $b + 5\frac{7}{12} = 6\frac{5}{9}$ $\underline{\frac{35}{36}}$ f. $d - 3\frac{4}{5} = 1\frac{7}{30}$ $\underline{5\frac{1}{30}}$

3. Help the students rename the top mixed numeral or whole number as necessary in order for the subtraction to be complete.

$\begin{array}{r} 4\frac{1}{18} \\ -\ 1\frac{7}{18} \\ \hline \end{array}$	$\underline{3\frac{19}{18}}$	$\begin{array}{r} 9\frac{3}{9} \\ -\ 2\frac{7}{9} \\ \hline \end{array}$	$\underline{8\frac{12}{9}}$	$\begin{array}{r} 8\frac{2}{10} \\ -\ 5\frac{8}{10} \\ \hline \end{array}$	$\underline{7\frac{12}{10}}$	$\begin{array}{r} 7\frac{1}{3} \\ -\ 5\frac{2}{3} \\ \hline \end{array}$	$\underline{6\frac{4}{3}}$
$\begin{array}{r} 9 \\ -\ 1\frac{4}{9} \\ \hline \end{array}$	$\underline{8\frac{9}{9}}$	$\begin{array}{r} 19 \\ 15\frac{2}{3} \\ \hline \end{array}$	$\underline{18\frac{3}{3}}$	$\begin{array}{r} 32 \\ -\ 7\frac{3}{10} \\ \hline \end{array}$	$\underline{31\frac{10}{10}}$	$\begin{array}{r} 11\frac{3}{11} \\ -\ 6\frac{6}{11} \\ \hline \end{array}$	$\underline{10\frac{14}{11}}$

945

946

CONTENT: Fractions and Operations

OBJECTIVE: The students will be able to subtract mixed numbers with unlike denominators, no regrouping. 5-7 *7

ACTIVITIES

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1. To subtract mixed numerals, first rename as like mixed numerals, subtract the fraction, then subtract the whole numbers.

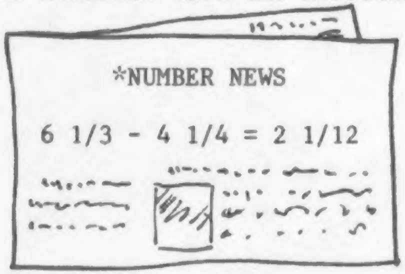
EXAMPLE:

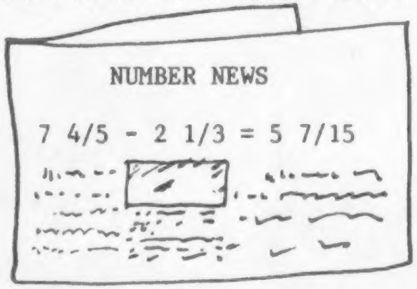
8-4/5 = 8-12/15
- 5-2/3 = 5-10/15
3-2/15

a. 7-11/12
- 2-1/3
(5-7/12)

b. 7-4/5
- 3-2/6
(4-7/15)

2. Have students read the headlines of the two papers and write at least two stories for each one.





3. Have students work at chalkboard to review subtraction of problems with mixed numerals. Explain to students that to complete the related mixed number subtraction, we subtract the fraction and then subtract the mixed numbers. Have students identify the least common denominator before rewriting problem. Provide examples for students such as:

EXAMPLE:

8-1/2 = 8-2/4
- 5-1/4 = 5-1/4
(3-1/4)

6-1/2 = 6-3/6
- 2-1/3 = 2-2/6
(4-1/6)

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to multiply a whole number by a proper fraction. 5-7 *7

ACTIVITIES

1. Give the students set of problems such as the following:

A	B
1/7 x 1 = n(1/7)	4/5 x 1 = n(4/5)
1/7 x 2 = n(2/7)	4/5 x 2 = n(1 3/5)
1/7 x 3 = n(3/7)	4/5 x 3 = n(2 2/5)
1/7 x 4 = n(4/7)	4/5 x 4 = n(3 1/5)
1/7 x 5 = n(5/7)	4/5 x 5 = n(4)

   Discuss the pattern formed by the answers.

2. Have the students bring in their favorite recipes. Tell them they are to pretend that over the next few weeks they will have to fix the dish for different groups of people. Have them figure how much of each ingredient will be necessary if 2, 3, 5, 10, 18 times the recipe is made.

3. Give the students number lines marked to show halves, thirds, or fourths. (Example: 0/4 through 16/4). Let them make hops on the number line to find the answers to problems such as the following:

   4 x 1/4 = (1) 3 x 3/4 = (2¼)

   7 x 1/4 = (1 3/4) 8 x 3/4 = (6)

949

950

CONTENT: Fractions and Operations

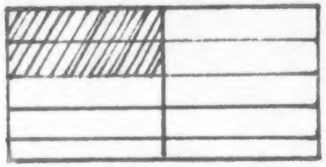
OBJECTIVE: The student will be able to multiply two proper fractions. 5-7 *7

ACTIVITIES

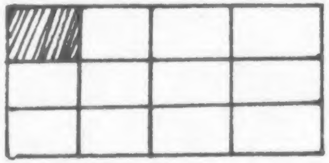
1. Let the students make their own fraction flash cards with the problem on one side and the answer on the other. This can be used as an extra time activity to reinforce the skill.

2. Give students the following list of fractions: 1/3, 2/3, 1/4, 3/4, 4/5, 5/6. Have them use each fraction one time each to write two multiplication sentences.

3. Let the students use grid paper to illustrate the answers of problems.



2/5 x 1/2 = 1/5



1/3 x 1/4 = 1/12

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to multiply a mixed number by a proper fraction. 5-8 *8

ACTIVITIES

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1. Have students bring in recipes for their favorite foods. Using these recipes, have them decide how much of each ingredient is needed if 1½, 2¼, 3½ and 4-1/3 times the recipe is made.

   Students may enjoy making a recipe book of all the recipes.

2. Write numerals like the following on the board:

24	75	$6\frac{4}{5}$	$8\frac{3}{10}$
18	67	$6\frac{5}{9}$	$\frac{11}{17}$
46	$5\frac{1}{3}$	$7\frac{1}{8}$	$\frac{23}{39}$

   Each student devises a word problem for multiplication using a whole number and a fraction or mixed numbers. The student writes the answer on the back of the paper. Put all problems in a folder and let the students work them at their convenience.

3. Write problems such as ½ of ¼ on the board. Have students fold a sheet of paper into fourths. Keeping the paper folded, they fold the ¼ into halves and color one of these halves. Now they unfold the paper to find ½ of ¼. The number of colored parts is the numerator (1). The total number of parts is the denominator (8) ½ of ¼ = 1/8. Have them fold paper to find the answers for these sentences.

   3/4 of 1/3   3/12 = 1/4   1/2 of 2/3   2/6 = 1/3

   3/4 of 3/8   9/32   1/4 of 1/4   1/16

CONTENT: Fractions and Operations

OBJECTIVE: Students will be able to multiply a whole number by a mixed number. 5-8 *8

ACTIVITIES

1. Have the students list the numbers 8 through 15 on their paper. Write the following exercises on the board. Students will write each exercise next to the numeral that is the answer.

$3\frac{2}{3}$ x 3 = $1\frac{4}{5}$ x 5 =

$2\frac{2}{3}$ x 3 = $2\frac{1}{7}$ x 7 =

$3\frac{1}{2}$ x 4 = $6\frac{1}{2}$ x 2 =

$2\frac{2}{5}$ x 5 = $2\frac{1}{2}$ x 4 =

2. Write the following whole numbers and mixed numbers on the board.

7, 9, 13, 23, 36, 45, $2\frac{1}{2}$, $1\frac{3}{4}$, $6\frac{2}{5}$, $5\frac{2}{3}$, $4\frac{5}{7}$, $12\frac{9}{10}$.

Have each student write a word problem for multiplication using one whole number and one mixed number. The student will write the answer on the back of the paper. Put all problems in a folder for students to work during their free time.

3. Have the students match mixed numbers and fractions:

$7\frac{1}{2}$ $3\frac{1}{4}$ $2\frac{3}{8}$ $4\frac{2}{3}$ $5\frac{3}{4}$ $6\frac{1}{3}$

$\frac{13}{4}$ $\frac{14}{3}$ $\frac{15}{2}$ $\frac{19}{8}$ $\frac{19}{3}$ $\frac{23}{4}$

Then have them multiply each improper fraction by the same whole number.

Example: 2 x 13/4 2 x 14/3 2 x 15/2 2 x 19/8 2 x 19/3 2 x 23/4

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to multiply two mixed numbers. 5-8 *8

ACTIVITIES

---

1. Divide students into groups with four students in each group. Each student will have a particular job. One student renames one of the mixed numerals to an improper fraction. The second student renames the other mixed numeral. The third student will multiply the problem and the fourth student will write a mixed numeral for the final answer. Jobs should be rotated with each example.

2. Have the students bring in their favorite recipes. Have them decide how much of each ingredient is needed if they want 3-3/4, 5-2/3, or 8-1/2 times as much as the recipe makes. Recipes may then be compiled into a recipe book to be shared with the whole class.

3. Write a mixed numeral on each of 8 or 10 cards. Have the students work in pairs. They should stack the cards face down between them then turn the cards over one at a time. Students rename the mixed numeral as a fraction. The first one to rename correctly scores a point. An answer key should be provided.

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to:
(1) identify the multiplicative inverse, reciprocal. 5-7 *7
(2) divide a proper fraction by a proper fraction. 5-7 *7
(3) divide a whole number by a proper fraction. 5-7 *7
(4) divide a proper fraction by a whole number. 5-7 *7

ACTIVITIES

Show students model example of how to write the reciprocal of a given number.

Proper Fractions

Example: 5/8 reciprocal 8/5 7/3 reciprocal 3/7

Whole Numbers

Example: 9 = 9/1 reciprocal 1/9 6 = 6/1 reciprocal 1/6

Explain that the reciprocal is the reverse of a given number. Give students practice in writing reciprocals. Introduce to students the steps involved in writing division problems.

a. Write a related multiplication sentence for the division sentence.

b. Divide the terms by common factors, if possible.

c. Multiply.

d. Express quotients in simplest form.

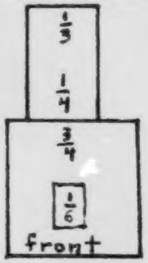
Example:

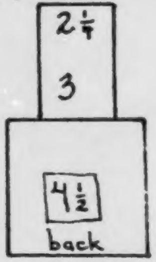
$$\frac{5}{6} \div \frac{5}{12} = \frac{\cancel{5}^{1}}{\cancel{6}_{1}} \times \frac{\cancel{12}^{2}}{5_{1}} = \frac{2}{1} = 2$$

$$6 \div \frac{9}{16} = \frac{6^{2}}{1} \times \frac{16}{\cancel{9}_{3}} = \frac{32}{3} = 10\frac{2}{3}$$

961 962

1. Cut off the ends of a sealed envelope. Cut a window through both thicknesses. Write a fraction such as 3/4 on the front. Make a strip to slide through the envelope so that fractions to be divided will show in the front window. On the reverse side, show the answer of each division so it will show out the window in the back of the envelope.





2. Write word problems on cards which are to be solved using division of fractions. Have students draw problems and solve. Then have students write similar problems to be solved by other students.

3. Write the following groups of fractions on a transparency or the chalkboard. Have the students write only the two which are reciprocals.

a. $\frac{3}{4}$ $\frac{4}{4}$ $\frac{1}{3}$ $\frac{4}{3}$

b. $\frac{1}{4}$ $\frac{6}{8}$ $\frac{8}{6}$ $\frac{2}{4}$

c. $\frac{1}{10}$ $\frac{10}{100}$ $\frac{10}{1}$ $\frac{10}{10}$

d. $\frac{1}{8}$ $\frac{3}{8}$ $\frac{1}{9}$ $\frac{8}{1}$

e. $\frac{3}{8}$ $\frac{1}{2}$ $\frac{2}{2}$ $\frac{2}{1}$

f. $\frac{6}{9}$ $\frac{2}{9}$ $\frac{2}{6}$ $\frac{9}{2}$

g. $\frac{8}{3}$ $\frac{3}{3}$ $\frac{3}{8}$ $\frac{1}{8}$

h. $\frac{3}{7}$ $\frac{7}{7}$ $\frac{7}{3}$ $\frac{3}{3}$

i. $\frac{8}{1}$ $\frac{7}{8}$ $\frac{8}{7}$ $\frac{8}{8}$

j. $\frac{3}{9}$ $\frac{3}{3}$ $\frac{9}{3}$ $\frac{1}{9}$

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to:
(1) divide a mixed number by a proper fraction. 5-8 *8
(2) divide a proper fraction by a mixed number. 5-8 *8

ACTIVITIES

1. Have students write the following five answers for division problems across the top of a sheet of paper:

$2\frac{2}{3}$, 9, $\frac{2}{3}$, $3\frac{3}{7}$, $\frac{4}{7}$

Then have the students complete the exercises below in any order they wish. If the answer is at the top of the page, the student crosses it out. Students must continue working until all the answers at the top of the page are crossed out.

$2\frac{1}{3} \div 3\frac{1}{2} = \_\_\_\_\_ \quad (\frac{2}{3})$

$2\frac{2}{3} \div \frac{5}{9} = \_\_\_\_\_ \quad (4\frac{4}{5})$

$\frac{4}{9} \div 1\frac{2}{3} = \_\_\_\_\_ \quad (\frac{4}{15})$

$10\frac{1}{2} \div 1\frac{3}{4} = \_\_\_\_\_ \quad (6)$

$18 \div 5\frac{1}{4} = \_\_\_\_\_ \quad (3\frac{3}{7})$

$5\frac{1}{4} \div \frac{3}{10} = \_\_\_\_\_ \quad (17\frac{1}{2})$

$21 \div 2\frac{1}{3} = \_\_\_\_\_ \quad (9)$

$2\frac{5}{8} \div \frac{7}{10} = \_\_\_\_\_ \quad (3\frac{3}{4})$

$18 \div 6\frac{3}{4} = \_\_\_\_\_ \quad (2\frac{2}{3})$

$1\frac{1}{3} \div 2\frac{1}{3} = \_\_\_\_\_ \quad (\frac{4}{7})$

2. Have students design and create a bulletin board showing division with fractions. Have them show large, worked-out examples and a brief description of the steps used for each model.

3. Let teams of four students have a division relay race. Dictate an exercise such as 1½ ÷ 3/4 = _____. On each team, the first student copies the exercise and renames the factors (3/2 ÷ 3/4). The second student rewrites the problem as a multiplication exercise (3/2 x 4/3). The third student multiplies (12/6). The fourth student simplifies the answer (2). The first team to find the correct answer scores the point. Repeat with similar division exercises.

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to:

(1) Divide a mixed number by a mixed number. 5-8 *8
(2) Divide a whole number by a mixed number. 5-8
(3) Divide a mixed number by a whole number. 5-8

ACTIVITIES

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1. Have students make a 4 x 4 grid and randomly write the following quotients in the boxes.

$\frac{1}{2}$, $\frac{2}{11}$, $\frac{3}{22}$, $2\frac{3}{10}$, $1\frac{2}{3}$, $3\frac{1}{5}$, $2\frac{1}{2}$, $2\frac{6}{11}$, $3\frac{9}{29}$, $1\frac{25}{52}$, $\frac{5}{54}$, $1\frac{9}{22}$, $\frac{34}{41}$, $\frac{2}{5}$

Write the following, one at a time, for students to solve. Students use beans or other markers to mark the answers on their grids. The first to mark four in a row vertically, horizontally, or diagonally wins the game.

$12 \div 3\frac{5}{8} =$ ______ $(3\frac{9}{29})$
$4\frac{2}{3} \div 1\frac{5}{6} =$ ______ $(2\frac{6}{11})$
$4\frac{4}{5} \div 2 =$ ______ $(2\frac{2}{5})$
$\frac{1}{3} \div 3\frac{3}{5} =$ ______ $(\frac{5}{54})$
$2\frac{7}{9} \div 1\frac{2}{3} =$ ______ $(1\frac{2}{3})$
$6\frac{9}{10} \div 3 =$ ______ $(2\frac{3}{10})$

$6\frac{5}{12} \div 4\frac{1}{3} =$ ______ $(1\frac{25}{52})$
$6\frac{7}{8} \div 2\frac{3}{4} =$ ______ $(2\frac{1}{2})$
$2\frac{7}{12} \div 1\frac{5}{6} =$ ______ $(1\frac{9}{22})$
$\frac{3}{4} \div 4\frac{1}{8} =$ ______ $(\frac{2}{11})$
$15\frac{5}{8} \div 3\frac{1}{8} =$ ______ (5)

$7\frac{1}{2} \div 15 =$ ______ (2)
$8 \div 2\frac{1}{2} =$ ______ (35)
$16\frac{4}{5} \div 4\frac{1}{5} =$ ______ (4)
$\frac{3}{8} \div 2\frac{3}{4} =$ ______ $(\frac{3}{22})$
$3\frac{2}{5} \div 4\frac{1}{10} =$ ______ $(\frac{34}{41})$

967 968

2. Have students complete exercises such as those shown below. Discuss the associative property as it relates to multiplication and division.

$(\frac{2}{3} \times \frac{3}{7}) \times \frac{1}{4} \quad \textcircled{=} \quad \frac{2}{3} \times (\frac{3}{7} \times \frac{1}{4})$

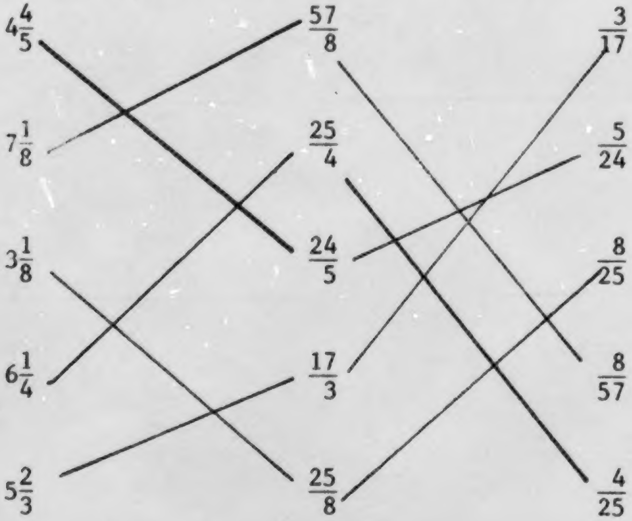
$(\frac{2}{5} \div \frac{8}{11}) \div \frac{3}{8} \quad \textcircled{\neq} \quad \frac{2}{5} \div (\frac{8}{11} \div \frac{3}{8})$

$1\frac{1}{2} \times (3\frac{2}{3} \times 2\frac{3}{4}) \quad \textcircled{=} \quad (1\frac{1}{2} \times 3\frac{2}{3}) \times 2\frac{3}{4}$

$(8 \div 4\frac{1}{3}) \div 1\frac{3}{4} \quad \textcircled{\neq} \quad 8 \div (4\frac{1}{3} \div 1\frac{3}{4})$

Multiplication is associative; division is not.

3. Give the students exercises such as the following. They should draw lines to match the mixed numeral with its corresponding fraction and reciprocal.


$4\frac{4}{5}$
$7\frac{1}{8}$
$3\frac{1}{8}$
$6\frac{1}{4}$
$5\frac{2}{3}$
$\frac{57}{8}$
$\frac{25}{4}$
$\frac{24}{5}$
$\frac{17}{3}$
$\frac{25}{8}$
$\frac{3}{17}$
$\frac{5}{24}$
$\frac{8}{25}$
$\frac{8}{57}$
$\frac{4}{25}$

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to name the product in simplest form by removing common factors from numerators and denominators before multiplying (cancellation). 5-8

---

1. Show the students the cancellation shortcut for multiplying fractions.

$$\frac{\overset{1}{\cancel{2}}}{\underset{1}{\cancel{3}}} \times \frac{\overset{1}{\cancel{3}}}{\underset{2}{\cancel{6}}} = \frac{1}{2}$$

Have students use shortcuts in exercises such as these:

a. 2/3 x 3/7 (27)
b. 1/4 x 2/5 (1/10)
c. 8/11 x 3/8 (3/11)
d. 6/7 x 1/2 (3/7)
e. 5/9 x 9/10 (1/2)
f. 3/16 x 8/9 (1/6)
g. 3/20 x 5/18 (1/24)
h. 4/15 x 5/16 (1/12)
i. 7/12 x 9/14 (3/8)

2. Have students use shortcuts in exercises such as these:

a. 1/2 x 2/3 x 3/4 (1/4)
b. 5/8 x 7/10 x 4/7 (1/4)
c. 5/6 x 9/10 x 2/3 (1/2)
d. 8/9 x 6/7 x 3/4 (4/7)
e. 5/12 x 1-3/5 x 7/10 (7/15)
f. 2-1/4 x 5-5/9 x 7/10 (8-3/4)
g. 6-7/8 x 2/11 x 4/5 (1)
h. 3-1/8 x 7-1/5 x 5-1/3 (120)
i. 2-3/4 x 3-1/15 x 10/11 (8)
j. 3-1/8 x 4-4/5 x 2/3 (10)

3. Show the students that the numerators in a multiplication problem may be moved around without changing the product.

EXAMPLE: 2/3 x 1/2 = 2/6 = 1/3

2/2 x 1/3 = 2/6 = 1/3

This will help them to understand cancellation. Have them work several simple problems using cancellation.

a. 1/2 x 2/7 (1/7)

b. 1/3 x 3/4 (1/4)

c. 2/5 x 1/4 (1/10)

d. 2/5 x 1/2 (1/5)

e. 4/5 x 3/4 (3/5)

f. 1/6 x 3/8 (1/16)

CONTENT: Fractions and Operations

OBJECTIVE: The student will be able to:

(1) order fractions with one digit denominators (limit: 4 fractions). 6-9 *9

(2) order fractions with two digit denominators (limit: 4 fractions). 7-10 *10

ACTIVITIES

1. Give the students a list of fractions such as those shown:

$$\frac{2}{3} = \frac{4}{6} = \frac{6}{9} = \frac{8}{12} = \frac{10}{15} = \frac{12}{18} = \frac{14}{21} = \frac{16}{24} = \frac{18}{27} = \frac{20}{30}$$

$$\frac{3}{5} = \frac{6}{10} = \frac{9}{15} = \frac{12}{20} = \frac{15}{25} = \frac{18}{30} = \frac{21}{35} = \frac{24}{40} = \frac{27}{45} = \frac{30}{50}$$

$$\frac{5}{8} = \frac{10}{16} = \frac{15}{24} = \frac{20}{32} = \frac{25}{40} = \frac{30}{48} = \frac{35}{56} = \frac{40}{64} = \frac{45}{72} = \frac{50}{80}$$

$$\frac{7}{10} = \frac{14}{20} = \frac{21}{30} = \frac{28}{40} = \frac{35}{50} = \frac{42}{60} = \frac{49}{70} = \frac{56}{80} = \frac{63}{90} = \frac{70}{100}$$

Have the students extend each list of equal fractions to include ten fractions. Have them use their lists to help compare these numbers.

a. 2/3 > 3/5
b. 2/3 > 5/8
c. 2/3 < 7/10
d. 3/5 < 5/8
e. 3/5 < 7/10
f. 5/8 < 7/10

g. 3/5 < 2/3
h. 7/10 > 3/5
i. 7/10 > 2/3
j. 5/8 < 2/3
k. 7/10 > 5/8
l. 5/8 > 3/5

2. Have the students write a mixed number or a whole number for each fraction. Then they write them in order from least to greatest along with the corresponding letters. A message will be spelled out when the numerals are in order.

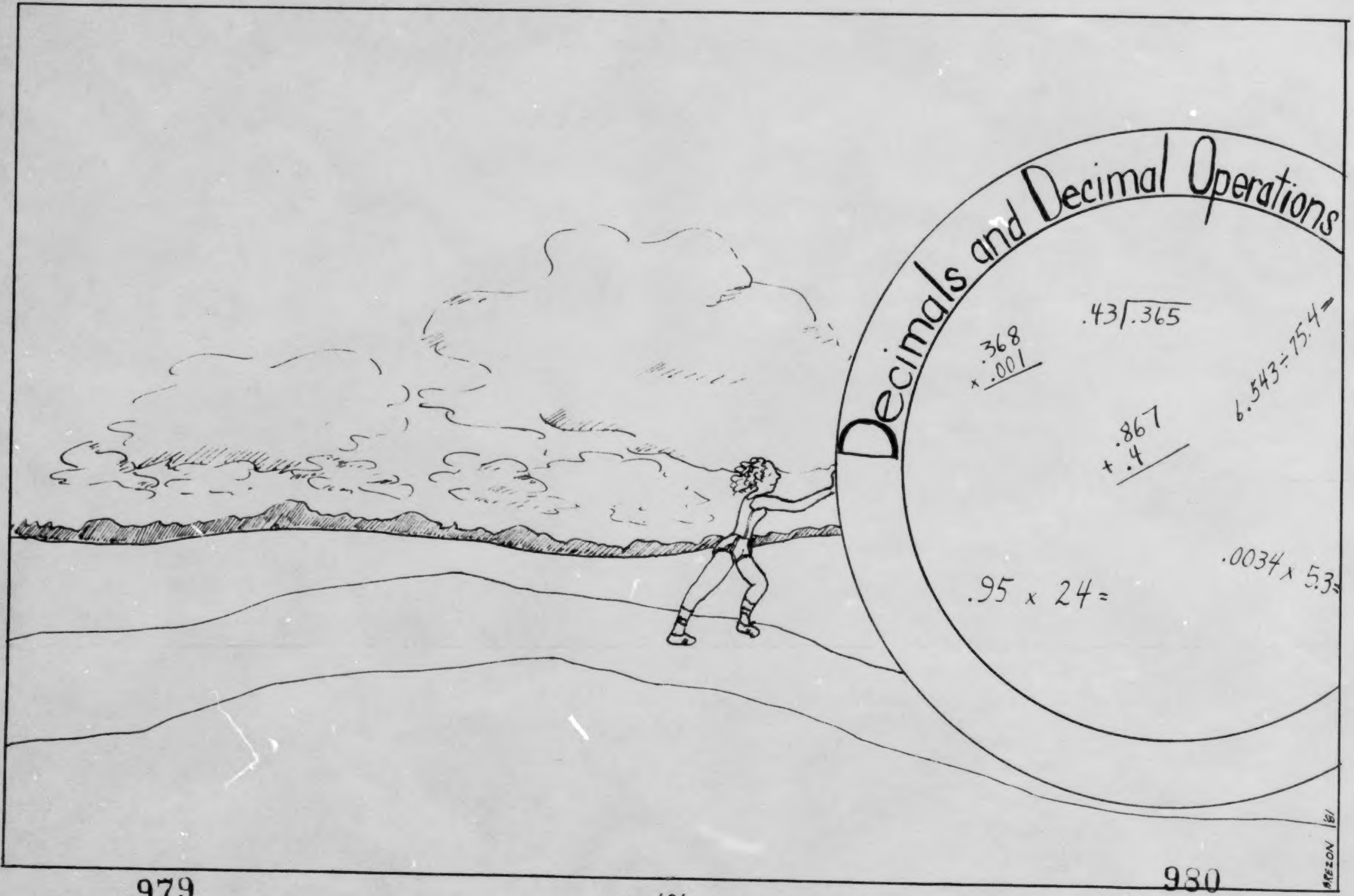
5	$5\frac{1}{4}$	$8\frac{5}{6}$	$1\frac{2}{5}$	14	2	$3\frac{6}{7}$
A	T	I	O	Z	U	M
$\frac{15}{3}$	$\frac{42}{8}$	$\frac{53}{6}$	$\frac{7}{5}$	$\frac{42}{3}$	$\frac{12}{6}$	$\frac{27}{7}$
R	Y	E	A	A	H	W
$\frac{6}{2}$	$\frac{5}{5}$	$\frac{22}{7}$	$\frac{16}{5}$	$\frac{14}{6}$	$\frac{12}{2}$	$\frac{14}{2}$
3	1	$3\frac{1}{7}$	$3\frac{1}{5}$	$2\frac{1}{3}$	6	7

YOU ARE A MATH WIZ.

3. Form two teams of 7 students. One team should have 3 girls and 4 boys, the other 5 girls and 2 boys. Ask, "What fraction of this team is girls? What fraction of that team is girls?" Write the fractions 3/7 and 5/7 on the board. Ask, "Which team has more girls?" Then ask, "Which fraction is greater, 5/7 or 3/7?" Have the students complete the sentence $5/7 > 3/7$. Repeat this procedure for the boys on the teams to lead to the question, "Which fraction is greater, 4/7 or 2/7?" Have students complete the sentence $4/7 > 2/7$. Continue using other combinations of boys and girls in various size groups.

977

978


Decimals and Decimal Operations
.43 ⟌ .365
.368
× .001
6.543 ÷ 75.4 =
.867
+ .4
.0034 × 5.3 =
.95 × 24 =
BREZON '81

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to:
(1) Read and write decimals through hundredths. 4-5 *5
(2) Read and write decimals through thousandths. 5-6 *6
(3) Read and write any decimal numeral to millionths. 5-8

ACTIVITIES

1. Write decimals naming tenths, hundredths, thousandths, etc., on cards. Stack the cards face down between two students. Taking turns, students draw a card and read the decimal. Each listens as the other reads.

2. Have the students examine a meter stick. Point out that the meter stick is 100 cm long. Have the children find 1 cm on the stick, then help them see that 1 mm is 1/10 of a centimeter, or 1/1000 of a meter. Then, have the students find some lengths of objects in mm and record their lengths in thousandths of a meter. Example: Width of a sheet of paper - 215 mm, or .215 m.

3. Have the students make place value charts to the appropriate decimal place. Give them a list of decimals to write in the chart and then read the decimals aloud.

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to read and write word names for decimal fractions. 6-8

ACTIVITIES

1. Play Concentration using decimal number words and numerals on 3" x 5" index cards. Place cards with words and numerals face down. A student turns up two at a time, trying to make a match. The winner is the person or team with the most matches.

2. Give the students 3" x 5" cards with selected decimal number words through hundred thousandths. Students may put them in chronological order or group them into categories greater than or less than a given number.

3. Have the students make word ladders of the words needed in reading decimal numerals. Give them lists to copy from. Put the word in the front of the card and the numeral on the back.

   Suggested lists for word ladders:

Ladder 1 (tenths)	Ladder 2 (hundredths)
one tenth	one hundredth
two tenths	two hundredths
three tenths	three hundredths
four tenths	.
five tenths	.
six tenths	.
seven tenths	.
eight tenths	.
nine tenths	ninety-nine hundredths

983 984

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to state the place value of each digit in a given decimal number as a fraction (Example: the place value of 5 in 3.0534 is 5/100). 6-8

ACTIVITIES

1. The meaning of each digit in a decimal may be shown by using words, fractions, or decimals.

Example: 0.348
→The 3 means 3 tenths, or 3/10, or 0.3
→The 4 means 4 hundredths, or 4/100, or 0.04
→The 8 means 8 thousandths, or 8/1000, or 0.008

For each decimal, express the meaning of the digit 2 in a fraction.

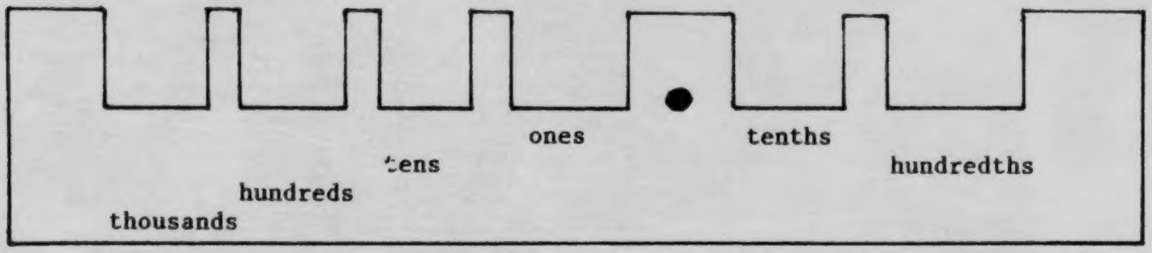
a. 0.72 (2/100)
b. 4.872 (2/1000)
c. 13.2564 (2/10)
d. 7915.062 (2/1000)
e. 5.82 (2/100)

2. For each decimal, express the meaning of each digit in three ways.

a. 0.274356

The 2 means 2 tenths, or 2/10, or 0.2.
The 7 means 7 hundredths, or 7/100, or 0.07.
The 4 means 4 thousandths, or 4/000, or 0.004.
The 3 means 3 ten thousandths, or 3/10,000, or 0.0003.
The 5 means 5 hundred thousandths, or 5/100,000, or 0.00005.
The 6 means 6 millionths, or 6/1,000,000, or 0.000006.

3. Prepare a ditto worksheet that includes a copy of the "Decimal Numeral Reader" as well as a variety of decimal numerals whose digits are spaced to fit the numeral reader. The worksheet might include such numerals as 3076.4, 0.35, 28.02, 609.51, and 750.8. Have the students cut out the numeral reader to use it as an aid in reading the given decimals.


ones
tenths
tens
hundredths
hundreds
thousands

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to identify decimals equivalent to $\frac{1}{5}$ - $\frac{4}{5}$, $\frac{1}{10}$ - $\frac{9}{10}$, $\frac{1}{100}$ - $\frac{99}{100}$.

4-5 *5

ACTIVITIES

1. Use a 10-strip to introduce tenths and their equivalent fractions $\frac{1}{10}$, $\frac{9}{10}$, $\frac{1}{5}$, $\frac{4}{5}$.

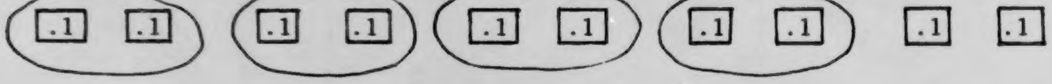
Review $\frac{1}{10}$ as meaning one of the 10 equal parts. Tell students that tenths can be written as a fraction ($\frac{1}{10}$) or a decimal (.1).

Cut the 10-strip into its 10 parts. Label each .1. Illustrate and write two-tenths through nine-tenths as fractions and decimals.

Example: $\boxed{.1}$ $\boxed{.1}$ $\boxed{.1}$ = $\frac{3}{10}$ or .3

Guide the students in using the tenths to show other fractions and their equivalent decimals.

$\frac{1}{2}$ = .5, $\frac{1}{5}$ = .2, $\frac{4}{5}$ = .8. For example, $\frac{4}{5}$ tells us to divide our tenths into 5 equal parts.



b. Give each child a hundred chart to introduce hundredths and their equivalent fractions:

.01	.01	.01	.01	.01	.01	.01	.01	.01	.01

(1) Guide the students to see that the whole has 100 parts. Each part is one of the hundred parts, 1/100. 1/100 may be written as a decimal (.01).

(2) Label each part as .01. Cut the hundred chart into 10 strips to show that 10 hundredths make one tenth. Have them write 10/100 as .10 which is the same as .1 or 1/10.

(3) Cut the tenths again to show each hundredth. Divide the hundredths into 4 equal parts to show that 1/4 equals 25 hundredths and is written .25. Divide the hundredths into 5 parts to show that 1/5 equals 20 hundredths which is the same as .2, etc.

2. For independent practice on equivalent decimals and fractions, make a manila folder similar to the following:

.5 .8

Match the numeral in the pocket to its equivalent	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{10}$	$\frac{3}{5}$	$\frac{4}{5}$
	$\frac{3}{4}$	$\frac{2}{5}$	$\frac{1}{5}$	$\frac{9}{10}$	$\frac{1}{100}$
	$\frac{99}{100}$	$\frac{30}{100}$	$\frac{7}{10}$	$\frac{45}{100}$	$\frac{18}{100}$
Decimal Squares	$\frac{2}{100}$	$1\frac{10}{10}$	$1\frac{3}{10}$	$1\frac{4}{10}$	$1\frac{6}{10}$
	$1\frac{75}{100}$	$1\frac{25}{100}$	$1\frac{10}{100}$	$1\frac{4}{8}$	$1\frac{8}{10}$

Make the decimal squares on a sheet of poster paper equal in size to the folder page. Before cutting the squares apart, glue a picture on the back. Students match decimal squares to fraction squares. Check by flipping the squares to see that the picture is complete.

3. Use 100 pennies and 10 dimes to illustrate hundredths and tenths, respectively. The teacher should guide students as in activity 1 above to manipulate the coins and complete a chart like the following:

MONEY MATCH

1 1

1 dollar = 1

○ 1 dime = $\frac{1}{10}$ or .10

○ 1 penny = $\frac{1}{100}$ or .01

1/2 of 10 dimes = .5	1/2 of 100 pennies = .5
1/5 of 10 dimes = .2	1/3 of 100 pennies = .2
4/5 of 10 dimes = .8	4/5 of 100 pennies = .8
1/10 of 10 dimes = .1	1/10 of 100 pennies = .1
9/10 of 10 dimes = .9	9/10 of 100 pennies = .9

993

994

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to identify decimal equivalents to 1/3, 2/3, 1/6 - 5/6, and 1/8 - 7/8. 5-6 *6

ACTIVITIES

1. Have the students write these fractions and decimals on separate cards:

   1/3, 2/5, 1/6, 2/6, 3/6, 4/6, 5/6, 1/8, 2/8, 3/8, 4/8, 5/8, 6/8, 7/8

   $.3\bar{3}$, .4, $.1\bar{6}$, .625, .75, $.3\bar{3}$, .5, $.6\bar{6}$, $.8\bar{3}$, .125, .25, .375, .5, .875

2. Have the students make a list of their favorite baseball players. Then have them find current information and compute the batting averages for the listed players.

3. Give the students several pages of 100-square graph paper. Have the students color in the fractional part for each fraction. Then they count the colored squares to discover the decimal equivalent for each fraction.

996

995

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to round decimal fractions to tenths, hundredths, thousandths, or ten thousandths. 6-7 *7

ACTIVITIES

1. Write numbers on separate cards. The following numbers may be used: .24, .42, .46, .67, .75, .2, .4, .5, .7, .8, 1.4, 1.6, 1.9, 1.38, 1.62, and 1.94. Have the students find eight matching pairs of decimals, naming hundredths and their approximations to the nearest tenth, e.g., .24 and .2.

2. Have each student write 10 decimals for numbers naming thousandths. Students exchange papers and for each decimal, write the approximation to the nearest hundredth; to the nearest tenth; and to the nearest whole number. They return the papers for checking.

3. Make a large number line showing the numbers from 1 through 10 and indicating tenths between each integer. Have students mark numbers such as 3.6, 5.9, 2.1 and 3.5 on the number line, and use the position on the number line to round each number to the nearest whole number.

997

998

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to determine decimal equivalents from a list such as .800, .080, .80 and .8.

6-8

ACTIVITIES

1. Circle the decimals that are equal to the first one in the list.

a.
[✓ .8]
[✓ .800]
.080
[✓ .80]
.008

b.
[✓ .3]
.030
[✓ .30]
.003
[✓ .300]

c.
[✓ .06]
.6
[✓ .060]
.60
[✓ .0600]

d.
[✓ .002]
.02
.200
[✓ .0020]
[✓ .00200]

e.
[✓ 1]
.1
[✓ 01.0]
[✓ 1.00]
.01

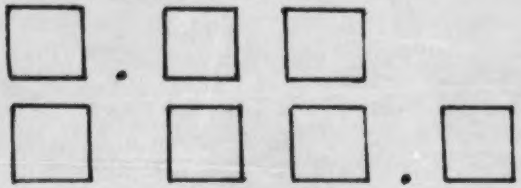
f.
[✓ 7.0]
.07
.7
[✓ 7]
[✓ 7.00]

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to write, count and expand decimal fractions. 5-8

ACTIVITIES

1. Have students work in pairs. Each student draws two rows of boxes including a decimal point somewhere in each row of boxes, e.g.,



Taking turns, each student rolls a number cube the number of times that he has boxes. After each roll, he writes the digit shown in any of the boxes. Have them read the numbers shown when all boxes are filled. Then have them move the decimals and read the resulting numbers.

2. Have the students search through references such as science books, encyclopedias, etc., to find decimals. Each student copies at least 10 decimals, then puts them in order from least to greatest.

3. Write these numerals on separate cards. Make the digit 2 red each time.

4.261
0.276
7.247
8.259

38.129
15.326
6.923
43.428

13.832
5.512
35.042
11.372

Shuffle the cards. Have the students find and read the numerals in which the red digit is in the tenths place, then put these cards in a stack. Repeat with hundredths and thousandths.

1001

1002

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to read and write decimals through hundredths. 4-5 *5

ACTIVITIES

1. a. Hold up a pair of whole numbers for students to identify the greater numeral and tell why:

518 - 223 529 - 546 537 - 532

Elicit the idea that we look at the place of greater value to see which is greater.

b. Hold up pairs of decimals.

.56 .63 .75 .04 .34 .35

Help students to see that we compare decimals just as we compare whole numbers. Tenths are greater than hundredths, so we look first at the tenths and then the hundredths.

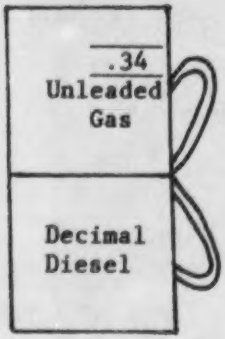
c. When students understand, distribute sets of five cards with decimals to five students. Students come to the front of the class and arrange themselves in order from lesser to greater. Example:

.5 .46 .43 .2 .1

2. Give each student a sheet of graph paper or other paper marked to show 100 square units. Let the student make a design by coloring in the squares. Have students make up questions about their designs, and write the answers as decimals. For example, "What part is blue? What part is not red?" Then list the colors used and the decimal representing that part from lesser to greater. For example: white .1, blue .25, orange .3.

3. Ask students if they have ever observed a gas pump pumping gas. Tell them that the gauge shows decimals increasing. Let each student make a gas pump from construction paper. Cut two slits as indicated. Insert adding paper tapes in the slits. Have students complete the decimal patterns on the tapes, counting by hundredths.

1003 1004


.34
Unleaded Gas
Decimal Diesel

.41
.42
____
____
____

.34
.35
____
____
____

.18
.19
____
____
____

.00
.01
____
____
____

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to arrange decimals according to size. 6-8 *8

ACTIVITIES

1. Give students a series of patterns in ordering decimals. Have them give the next four numbers of the pattern.

a.	2.8	2.9	3.0	3.1	☐	☐	☐	☐
b.	4.5	4.6	4.7	4.8	☐	☐	☐	☐
c.	6.8	6.9	7.0	7.1	☐	☐	☐	☐
d.	.095	.096	.097	.098	☐	☐	☐	☐
e.	.5	.6	.7	.8	☐	☐	☐	☐
f.	1.56	1.57	1.58	1.59	☐	☐	☐	☐
g.	.85	.86	.87	.88	☐	☐	☐	☐

a. 3.2, 3.3, 3.4, 3.5
b. 4.9, 5.0, 5.1, 5.2
c. 7.2, 7.3, 7.4, 7.5
d. .099, .100, .101, .102
e. .9, 1.0, 1.1, 1.2
f. 1.60, 1.61, 1.62, 1.63
g. .89, .90, .91, .92

2. Have students list the numbers in each set from the least to the greatest.

a. .160, .610, .106, .061
b. 3.77, 3.70, 7.03, 3.07
c. 1846, 1486, .684, .468
d. 97.6, 79.6, 96.7, 76.9
e. .003, .030, .300, 3.00
f. 1.095, 1.905, 1.950, 1.509
g. .321, .231, .312, .213
h. .3254, .3425, .3245, .3524

a. .061, .106, .160, .610

b. 3.07, 3.70, 3.77, 7.03

c. .468, .486, .684, .846

d. 76.9, 79.6, 96.7, 97.6

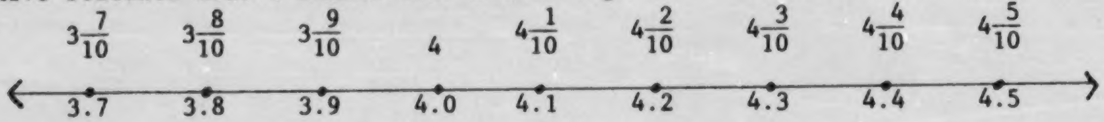
e. .003, .030, .300, 3.00

f. 1.095, 1.509, 1.905, 1.950

g. .213, .231, .312, .321

h. .3245, .3254, .3425, .3524

3. Have students make a number line and arrange the numerals in order from the least to the largest.



$3\frac{7}{10}$
$3\frac{8}{10}$
$3\frac{9}{10}$
4
$4\frac{1}{10}$
$4\frac{2}{10}$
$4\frac{3}{10}$
$4\frac{4}{10}$
$4\frac{5}{10}$
3.7
3.8
3.9
4.0
4.1
4.2
4.3
4.4
4.5

a. 3.1, 3.4, 3.3

b. 5.7, 5.6, 5.3

c. 4.2, 4.5, 4.6

d. 3.7, 4.4, 5.6

e. 3.5, 7.8, 5.6

f. 8.3, 5.4, 6.9

g. 3.6, 5.9, 4.3

h. 3.8, 3.3, 8.4

i. 5.8, 4.5, 5.6

j. 4.3, 3.7, 2.5

a. 3.1, 3.3, 3.4

b. 5.3, 5.6, 5.7

c. 4.2, 4.5, 4.6

d. 3.7, 4.4, 5.6

e. 3.5, 5.6, 7.8

f. 5.4, 6.9, 8.3

g. 3.6, 4.3, 5.9

h. 3.3, 3.8, 8.4

i. 4.5, 5.6, 5.8

j. 2.5, 3.7, 4.3

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to use <, >, or = to compare decimal fractions. 6-8

ACTIVITIES

1. Show the students that when two decimals do not have the same number of decimal places, we add one or two zeros before comparing them.

   a. $.2 \boxed{>} .15$
   b. $.7 \boxed{>} .653$
   c. $.32 \boxed{<} .327$
   d. $.2 \boxed{<} .35$
   e. $.7 \boxed{<} .853$
   f. $.32 \boxed{<} .329$
   g. $4.2 \boxed{<} 4.35$
   h. $6.7 \boxed{<} 6.853$
   i. $7.32 \boxed{<} 7.329$
   j. $18.4 \boxed{>} 18.399$

2. Have the students solve problems such as the following:

   a. $2.46 + 3.85 \boxed{>} 5.31$
   b. $1.5 + 9.78 \boxed{<} 12.28$
   c. $8.2 + 5.46 \boxed{>} 13.6$
   d. $8.96 + 6.78 \boxed{>} 14.74$
   e. $9.65 + 8.08 \boxed{>} 17.63$
   f. $5.321 + 6.007 \boxed{=} 11.328$
   g. $12.873 + 6.445 \boxed{>} 18.318$
   h. $12.196 + .02 \boxed{>} 12.198$
   i. $4.57 + 8.032 \boxed{<} 12.609$
   j. $16.012 + 13.55 \boxed{=} 29.562$

3. Have students solve problems such as the following:

   a. $.4 \boxed{>} .2$
   b. $.31 \boxed{<} .33$
   c. $.4 \boxed{>} .3$
   d. $.37 \boxed{>} .33$
   e. $7.4 \boxed{>} 7.3$
   f. $8.37 \boxed{>} 8.33$
   g. $.456 \boxed{>} .444$
   h. $.456 \boxed{<} .466$
   i. $5.456 \boxed{<} 5.466$
   j. $1.449 \boxed{<} 1.500$

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to:

(1) add decimals through hundredths. 4-5 *5
(2) add decimals through thousandths. 5-6 *6
(3) find the sum of two or more decimal fractions having the same number of decimal places. 5-8
(4) find the sum of two or more decimal fractions having a different number of decimal places. 6-8

ACTIVITIES

1. Remind students that when they add decimals they must be careful to line up the decimal points in the addends and the sum. Have them complete the following table:

+	854	85.4	8.54	.854
538	(1392)	(623.4)	(546.54)	(538.854)
53.8	(907.8)	(139.2)	(62.34)	(54.654)
5.38	(859.38)	(90.78)	(13.92)	(6.234)
.538	(854.538)	(85.938)	(9.078)	(1.392)

2. Have students complete path puzzles.

Rules: Enter at the left. Leave at the right. You may move to the right, but not to the left. You may move up or down, but only in the middle columns. You may not move diagonally.

.3	.9	2.7	1.6	1.8
2.3	1.5	1.2	.8	1.7
.6	2.6	2.4	1.3	.5
1.0	1.4	2.2	.7	2.0
1.9	.4	2.1	2.5	1.1

a. Find a path that gives a sum of 7.6.

b. Find a path that gives a sum of 9.3.

c. Find a path that gives a sum of 9.4.

d. What 9 block path gives a sum of 15.4?

e. What 5 block path gives the least sum?

f. Use a calculator to find the greatest possible sum:
(1) .3 + .9 + 2.7 + 1.2 + .8 + 1.7
(2) .6 + 2.6 + 2.4 + 1.2 + .8 + 1.7
(3) 1.9 + .4 + 2.1 + 2.5 + .7 + 1.3 + .5
(4) .3 + .9 + 2.7 + 1.2 + 2.4 + 2.2 + 2.1 + 2.5 + 1.1
(5) .3 + .9 + 2.7 + 1.6 + 1.8 or 1.0 + 1.4 + 2.2 + .7 + 2.0
(6) 28 (Start with 1.9, go up the second column, down the third columm, up the fourth column, and out at 1.8.)

3. Use a number line labelled in tenths or rename the wires of an abacus to include tenths and hundredths. Have your students work the following problems and illustrate on the number line or abacus.

```
   .5        1.6       .32        .5       .74
 + .4      +  .9     + 2.6     + 2.46    + 3.62
 ----      -----     -----     ------    ------
```

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to:

(1) subtract decimals through hundredths. 4-5 *5

(2) subtract decimals through thousandths. 5-6 *6

(3) find the difference of two decimal fractions having the same number of decimal places. 6-8

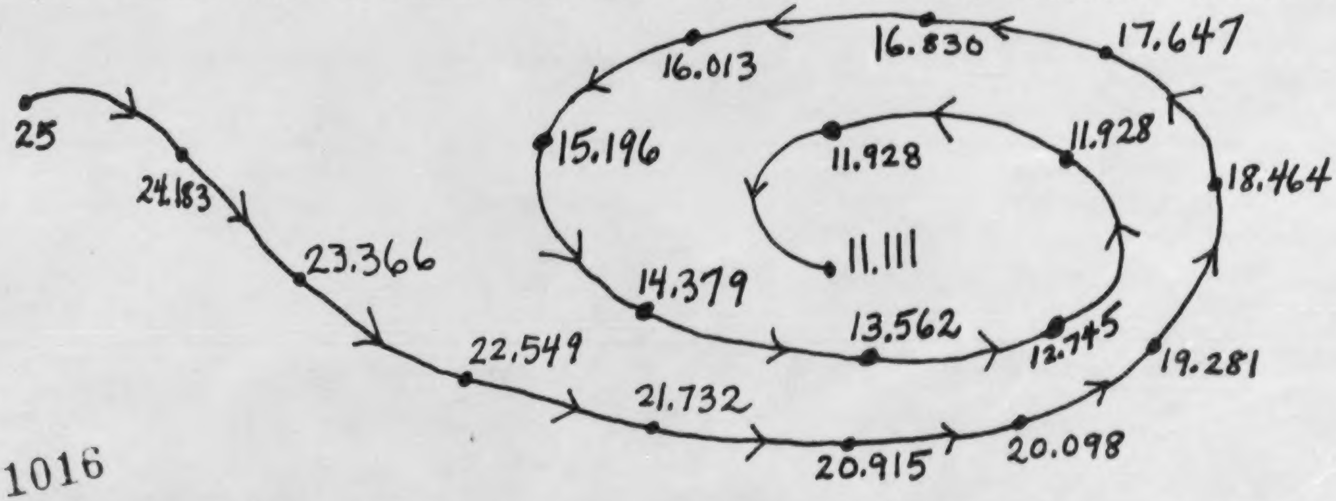
(4) find the difference of two or more decimal fractions having a different number of decimal places. 6-8

ACTIVITIES

1. Duplicate the magic square shown below. Have students supply numbers so that the sum along each row, column and diagonal is the same.

10.55	.05	(7.55)
(3.05)	6.05	(9.05)
(4.55)	(12.05)	1.55

2. Have students write the correct number next to the dot. The arrow stands for "subtract .817."


25
24.183
23.366
22.549
21.732
20.915
20.098
19.281
18.464
17.647
16.830
16.013
15.196
14.379
13.562
12.745
11.928
11.928
11.111

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to multiply a whole number (limit: 3 digits) by a decimal (limit: thousandths). 5-7 *7

ACTIVITIES

---

1. Have half the students write a 2 or 3-digit number on a card. Have the other half write a decimal numeral naming ones and hundredths, e.g., 8.35, on a card. Let one student pull a card from each group and write a multiplication problem. Students estimate the product, then complete the multiplication. This activity may be done as a class relay, individual activity or small groups.

2. Let the students become rule machines by completing charts such as the following:

Multiply by 46

Input	Output
1.01	46.46
4.2	193.2
15.8	726.8
2.76	126.96
79.6	3661.6

Multiply by 37.2

Input	Output
48	1,785.6
326	12,127.2
98	3,645.6
532	19,790.4
6849	254,782.8

Multiply by 965

Input	Output
17.6	16,984
3.2	3,088
6.15	5,934.75
84.265	81,315.725
99.999	96,499.035

3. Give the students several problems such as those below, leaving out the decimals. Have them place the decimal point in each answer correctly.

1.01	4.2	25	5.6	42
x 99	x 8	x 1.1	x 9	x 3.7
99.99	33.6	27.5	50.4	155.4

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to multiply a decimal by a decimal (limit: thousandths). 6-7 *7

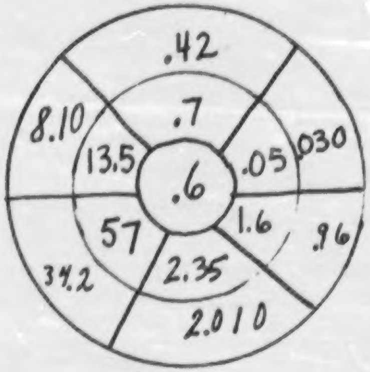
ACTIVITIES

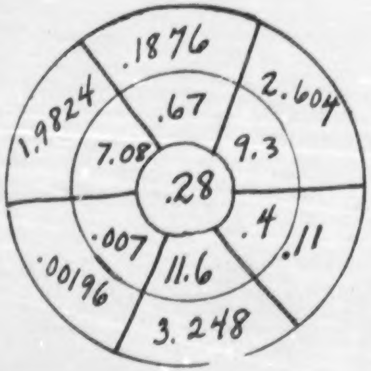
1. Ask the class to look for a pattern as they complete the table below:

	FACTORS	NO. OF DECIMAL PLACES	PRODUCT	NO. OF DECIMAL PLACES
a.	.26 and 3	2 and 0	.78	2
b.	.26 and .3	2 and 1	.078	3
c.	6.21 and .43	2 and 2	2.6703	4
d.	3.7 and .06	1 and 2	.222	3
e.	.12 and .25	2 and 2	.0300	4

Hold a class discussion on the pattern discovered in the table.

2. Hit the target by multiplying the numbers in the center of the circle by each of the numbers around it. Write the answers in the spaces provided.


.6
.7
.42
.05
.030
1.6
.96
2.35
2.010
57
34.2
13.5
8.10


.28
.67
.1876
9.3
2.604
.4
.11
11.6
3.248
.007
.00196
7.08
1.9824

1020

1021

3. To help your students better understand the movement of the decimal point in multiplication, give them a sequence of problems such as the following which they are to solve and discuss.

26 x 4	104
2.6 x 4	10.4
2.6 x .14	1.04
.26 x .4	.104
.026 x .4	.0104
.026 x 4	.104
.026 x .04	.00104

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to find the product of a whole number or decimal fraction and .1, .01, .001, and .0001. 5-8

ACTIVITIES

1. Have students multiply each of the following whole numbers by .1, .01, .001, and .0001.

X	27	306	5005	42,691	267,385
.1	(2.7)	(30.6)	(500.5)	(4269.1)	(26,738.5)
.01	(.27)	(3.06)	(50.05)	(426.91)	(2,673.85)
.001	(.027)	(.306)	(5.005)	(42.691)	(267.385)
.0001	(.0027)	(.0306)	(.5005)	(4.2691)	(26.7385)

2. Prepare a number cube with 1, .1, .01, .001, and .0001 on its faces. The game board should look as follows:

72.5	48.39	309.1	6.51	62.44
3.091	624.4	725	483.9	65.1
.0651	72.5	6.244	.3091	4.839
.6244	3.091	.4839	.0725	.651

Players take turns. The first player places a marker on a number in the top section of the board and a marker on a number in the bottom section which contains the same digits, excluding zeros, e.g., 51.4 and 5140. The student names the number that the greater number, 5140, would be multiplied by to get 51.4, then tries to roll that number. If the correct multiplier is rolled, the markers are left in the spaces. The student who covers the most numbers is the winner.

3. Make sets of cards such as the following. Have the students arrange the cards to make a correct equation.

A. $\boxed{6}\quad\boxed{\times}\quad\boxed{.1}\quad\boxed{=}\quad\boxed{.6}$

B. $\boxed{7}\quad\boxed{\times}\quad\boxed{.01}\quad\boxed{=}\quad\boxed{.07}$

C. $\boxed{9}\quad\boxed{\times}\quad\boxed{.001}\quad\boxed{=}\quad\boxed{.009}$

D. $\boxed{13}\quad\boxed{\times}\quad\boxed{.0001}\quad\boxed{=}\quad\boxed{.0013}$

E. $\boxed{8}\quad\boxed{\times}\quad\boxed{.0001}\quad\boxed{=}\quad\boxed{.0008}$

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to divide decimal fractions. 6-8

ACTIVITIES

1. Have students check the examples below by multiplying the divisor and the quotient. Tell them to put an "X" on any incorrect examples.

$\begin{array}{r}36.7\\ .04\,\overline{)1.468}\end{array}$ $\begin{array}{r}.42\\ .05\,\overline{).0210}\end{array}$ $\begin{array}{r}5.2\\ .08\,\overline{).416}\end{array}$ $\begin{array}{r}110.4\\ .06\,\overline{)6.624}\end{array}$

$\begin{array}{r}145\\ .22\,\overline{)31.9}\end{array}$ $\begin{array}{r}4.8\\ .96\,\overline{)4.608}\end{array}$ $\begin{array}{r}3.1\\ .64\,\overline{)1.984}\end{array}$ $\begin{array}{r}8.59\\ .15\,\overline{)1.2885}\end{array}$

2. Have the students work the problems and write the letter that is matched with the answer.

F	R	E	N	C	H	F	R	I	E	S
60.7	6.55	.506	.06	6.9	.16	60.7	6.55	.68	.506	6.5

S = $.09\,\overline{).585}$

H = $.52\,\overline{).0832}$

R = $39\,\overline{)255.45}$

I = $.4\,\overline{).272}$

C = $7.1\,\overline{)48.99}$

F = $.8\,\overline{)48.56}$

N = $.41\,\overline{).0246}$

E = $1.7\,\overline{).8602}$

3. To help students better understand the movement of the decimal point in division, give them a sequence of problems such as the following which they are to solve and discuss.

$.5\,\overline{)\,.15}$	$.05\,\overline{)\,.15}$
$.5\,\overline{)\,1.5}$	$.05\,\overline{)\,1.5}$
$.5\,\overline{)\,15}$	$.05\,\overline{)\,15}$
$.5\,\overline{)\,150}$	$.05\,\overline{)\,150}$

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to rename any fractional number whose denominator is a power of 10 to its decimal equivalent.

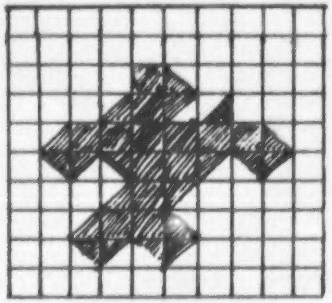
6-8

ACTIVITIES

1. Tell the students that decimals are fractions with denominators of 10, 100, 1000, and so on. Draw 10 lines on the chalkboard. Mark six of them. Ask a student to tell what fraction of the lines are marked. Then have another student give the decimal for 6/10. Repeat with other numbers.

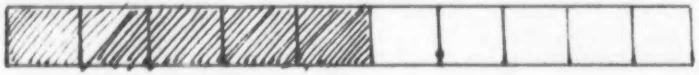
   Write as a decimal:

   a. 7/10 (0.7)
   b. 39/100 (0.39)
   c. 9/10 (0.9)
   d. 17/100 (0.17)

2. 

   The area of the square region is 100cm². Name the shaded area as a fraction and decimal. (23/100; 0.23)

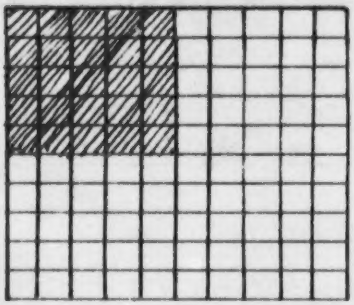
3. Have the children observe that the fraction 5/10 tells what part of the 10-strip is colored.

   5/10 or 0.5

   a. Show the fraction 7/10 and write it as a decimal. (0.7)

   b. Show the fraction 9/10 and write it as a decimal. (0.9)



The fraction 25/100 can be shown as hundredths on a 100-square.

25/100 or 0.25

c. Show the fraction 50/100 and write it as a decimal. (0.50 or 0.5)

d. Show the fraction 75/100 and write it as a decimal. (0.75)

1033

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to change common fractions to an equivalent fraction. 6-8 *8

ACTIVITIES

---

1. Remind students that a fraction indicates division of the numerator by the denominator. Write problems such as the following on the board:

$\frac{2}{5} = 5\overline{)2}$ $\qquad$ $\frac{1}{4} = 4\overline{)1}$

$\frac{23}{25} = 25\overline{)23}$ $\qquad$ $\frac{41}{64} = 64\overline{)41}$

Tell the students that they may add zeroes after the decimal point without changing the value of the numbers. Suggest that they use as many zeroes as needed to obtain a zero remainder. Thus,

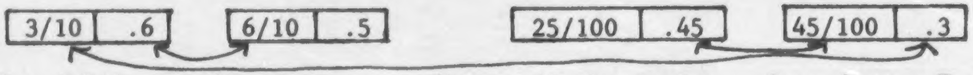
$$\begin{array}{r} .4 \\ 5\overline{)2.0} \end{array} \qquad \begin{array}{r} .25 \\ 4\overline{)1.00} \end{array} \qquad \begin{array}{r} .92 \\ 25\overline{)23.00} \end{array} \qquad \begin{array}{r} .640625 \\ 64\overline{)41.000000} \end{array}$$

2. Have the students find the batting averages of the players. Divide the number of hits by the number of times at bat. Batting averages are always given to the nearest thousandths.

PLAYER	NUMBER OF HITS	TIMES AT BAT	FRACTIONAL COMPARISON	BATTING AVERAGE
A. Glenda	7	22	? 7/22	? .318
B. Betty	9	31	? 9/31	? .290
C. Bill	6	19	? 6/19	? .316
D. Ray	16	45	? 16/45	? .356
E. Bonnie	11	38	? 11/38	? .289

3. Cut several "dominoes" from tagboard using pieces 2" x 4". On one half write a common fraction and on the other half a decimal fraction. The items will not be equal. Make four copies of each domino.

Example:



The game is played like regular dominoes. Place all the dominoes face down. Four players may draw four dominoes each. The first player may place any one of his dominoes in the center, and succeeding players may match the decimal fraction or common fraction with its equivalent.

If a person cannot play, he draws another card from the center, and play passes on. The first player to use all his dominoes is the winner.

1037

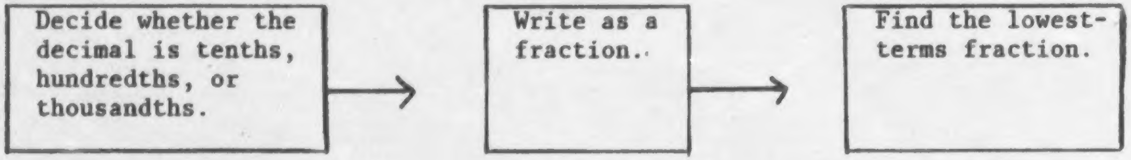
1036

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to change a decimal fraction to an equivalent common fraction. 7-8 *8

ACTIVITIES

1. Discuss the flow chart with the students.


Decide whether the decimal is tenths, hundredths, or thousandths.
Write as a fraction.
Find the lowest-terms fraction.

.25	$\frac{25}{100}$	$\frac{1}{4}$
.486	$\frac{486}{1000}$	$\frac{243}{500}$
2.377	$2\frac{377}{1000}$	$2\frac{377}{1000}$

Have students find fraction equivalent for decimal fractions such as the following:

a. 1.35 $(1\frac{7}{20}$

b. .3 $(\frac{3}{10})$

c. 4.7 $(4\frac{7}{10})$

d. .9 $(\frac{9}{10})$

e. .055 $(\frac{1}{200})$

f. .05 $(\frac{1}{20})$

g. .125 $(\frac{1}{8})$

h. 9.75 $(9\frac{3}{4})$

i. 1.45 $(1\frac{9}{20})$

j. .50 $(\frac{1}{2})$

k. .875 $(\frac{7}{8})$

l. 8.25 (8¼)

1038

1039

2. Have students complete charts such as the following:

Decimal	Lowest Term Fraction
(2)	$\frac{1}{5}$
3.14	(3 $\frac{5}{70}$)
1.003	(1 $\frac{3}{1000}$)
(.06)	$\frac{3}{50}$
.15	($\frac{3}{20}$)
(47.5)	47 $\frac{1}{2}$

Decimal	Lowest Term Fraction
.17	($\frac{17}{100}$)
98.16	(98 $\frac{4}{25}$)
(2.007)	(2 $\frac{7}{1000}$)
4.05	(4 $\frac{1}{20}$
(4.88)	4 $\frac{22}{25}$
(.0007)	$\frac{7}{10,000}$

3. See domino game - previous page.

1040

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to use division to change a fraction to a decimal fraction when the result is a terminating decimal. 6-8

ACTIVITIES

1. You will need several copies of a worksheet on which you have written about 20 number sentences. Set up a worksheet like this:

   A. $\frac{3}{5} =$ ______ B. $\frac{1}{2} =$ ______ C. $\frac{9}{10} =$ ______

   Separate the class into teams and give a worksheet to the first player in each team. This player writes the answer for exercise A and passes the sheet to the next player, and so on. Each team continues until the worksheet is completed, which means that a player will have the worksheet more than once.

   The team that finishes first and has the greatest number of correct responses is the winning team.

2. Challenge the students to attempt to find all of the unit fractions with denominators of 100 or less that can be represented by terminating decimals. The following list shows such fractions:

   2 ________ $\frac{1}{2}$

   2 x 2 ________ $\frac{1}{4}$

   5 ________ $\frac{1}{5}$

   2 x 2 x 2 ________ $\frac{1}{8}$

   2 x 5 ________ $\frac{1}{10}$

   2 x 2 x 2 x 2 ________ $\frac{1}{16}$

   2 x 2 x 5 ________ $\frac{1}{20}$

   5 x 5 ________ $\frac{1}{25}$

   2 x 2 x 2 x 2 x 2 ________ $\frac{1}{32}$

   2 x 2 x 2 x 5 ________ $\frac{1}{40}$

   2 x 5 x 5 ________ $\frac{1}{50}$

   2 x 2 x 2 x 2 x 2 x 2 ________ $\frac{1}{64}$

   2 x 2 x 2 x 2 x 5 ________ $\frac{1}{80}$

   2 x 2 x 5 x 5 ________ $\frac{1}{100}$

3. Show the students how to find a decimal fraction by dividing the denominator into the numerator. Have them divide until the remainder is zero.

A. $\frac{1}{2}$ (.5)

B. $\frac{3}{4}$ (.75)

C. $\frac{2}{5}$ (.4)

D. $\frac{1}{8}$ (.125)

E. $\frac{7}{16}$ (.4375)

F. $\frac{1}{4}$ (.25)

G. $\frac{4}{5}$ (.8)

H. $\frac{7}{8}$ (.875)

I. $\frac{9}{16}$ (.5625)

J. $\frac{5}{8}$ (.625)

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to use division to change a fraction when the result is a repeating decimal. 6-8

ACTIVITIES

1. Give the students a list of fractions. Have them separate them into terminating decimals and repeating decimals. A sample list follows:

$\frac{7}{8}$, $\frac{1}{3}$, $\frac{17}{25}$, $\frac{3}{4}$, $\frac{2}{3}$, $\frac{9}{20}$, $\frac{1}{6}$, $\frac{9}{10}$, $\frac{1}{12}$, $\frac{1}{2}$, $\frac{4}{9}$, $\frac{7}{15}$, $\frac{4}{8}$, $\frac{5}{16}$, $\frac{5}{6}$, $\frac{8}{11}$

Terminating

$\frac{7}{8} = .875$

$\frac{17}{25} = .68$

$\frac{3}{4} = .75$

$\frac{9}{20} = .45$

$\frac{9}{10} = .9$

$\frac{1}{2} = .5$

$\frac{4}{8} = .5$

$\frac{5}{16} = .3125$

Repeating

$\frac{1}{3} = .\overline{3}$

$\frac{2}{3} = .\overline{6}$

$\frac{1}{6} = .\overline{16}$

$\frac{1}{12} = .\overline{83}$

$\frac{4}{9} = .\overline{4}$

$\frac{7}{15} = .\overline{46}$

$\frac{5}{6} = .\overline{83}$

$\frac{8}{11} = .\overline{72}$

2. Have the students write each of the following fractions as a decimal to four places. Ask them to try to discover a pattern.

A. $\frac{1}{9}$ $\underline{(.1111)}$

B. $\frac{2}{9}$ $\underline{(.2222)}$

C. $\frac{3}{9}$ $\underline{(.3333)}$

D. $\frac{4}{9}$ $\underline{(.4444)}$

E. $\frac{5}{9}$ $\underline{(.5555)}$

F. $\frac{6}{9}$ $\underline{(.6666)}$

G. $\frac{7}{9}$ $\underline{(.7777)}$

H. $\frac{8}{9}$ $\underline{(.8888)}$

I $\frac{1}{11}$ $\underline{(.0909)}$

J. $\frac{2}{11}$ $\underline{(.1818)}$

K. $\frac{3}{11}$ $\underline{(.2727)}$

L. $\frac{4}{11}$ $\underline{(.3636)}$

M. $\frac{5}{11}$ $\underline{(.4545)}$

N. $\frac{6}{11}$ $\underline{(.5454)}$

O. $\frac{7}{11}$ $\underline{(.6363)}$

P. $\frac{8}{11}$ $\underline{(.7272)}$

3. Let the students use a calculator to write $\frac{1}{8}$, $\frac{2}{18}$, $\frac{3}{18}$ . . . . $\frac{17}{18}$ as decimals. Have them use a bar to show the digits that repeat.

$\underline{.0\overline{5}}$, $\underline{.\overline{1}}$, $\underline{.1\overline{6}}$, $\underline{.\overline{2}}$, $\underline{.2\overline{7}}$, $\underline{.\overline{3}}$, $\underline{.3\overline{8}}$, $\underline{.\overline{4}}$, $\underline{.5}$, $\underline{.\overline{5}}$, $\underline{.6\overline{1}}$, $\underline{.\overline{6}}$, $\underline{.7\overline{2}}$, $\underline{.\overline{7}}$, $\underline{.8\overline{3}}$, $\underline{.\overline{8}}$,

$\underline{.9\overline{4}}$

CONTENT: Decimals and Decimal Operations

OBJECTIVE: The student will be able to write the decimal equivalent of a fraction or mixed number. 6-8

ACTIVITIES

1. Have the students find each baseball player's batting average by dividing the number of hits by the number of times at bat. The average is to be written to the nearest thousandth.

BATTER	NO. OF HITS	TIMES AT BAT	BATTING AVERAGE
Bobby	14	58	(.241)
Diane	7	25	(.280)
Ray	12	52	(.231)
Betty	8	26	(.308)
Bill	17	65	(.262)
Sandy	9	30	(.300)
Dan	19	62	(.307)
Bonnie	16	48	(.333)

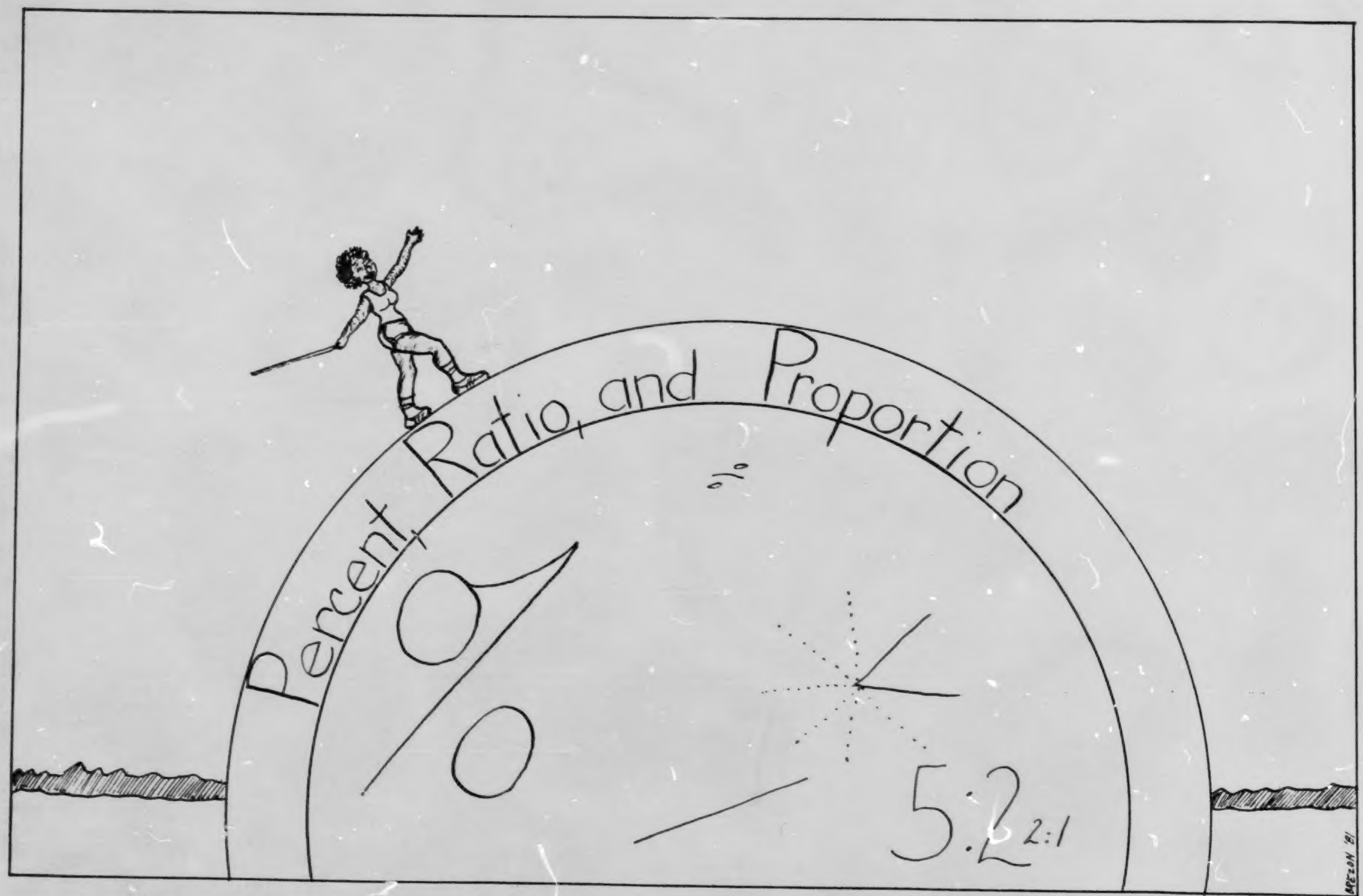
2. Have the students find each player's batting average by dividing the number of hits by the number of times at bat and giving the average in thousandths.

YEAR	BATTER	NO. OF HITS	TIMES AT BAT	BATTING AVERAGE
1941	Ted Williams	185	456	(.406)
1894	Hugh Duffy	236	539	(.438)
1901	Napoleon Lajoie	229	543	(.422)
1975	Dave Cash	213	699	(.305)
1911	Ty Cobb	248	591	(.420)
1972	Roberto Clemente	118	378	(.312)
1972	Cesar Cedeno	179	559	(.320)
1924	Babe Ruth	200	529	(.378)
1968	Carl Yastrzemski	162	539	(.301)
1949	George Kell	179	522	(.343)
1949	Ted Williams	194	566	(.343)
1927	Lou Gehrig	218	584	(.373)

3. Have students write these fractions and decimals on separate cards:

$\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{1}{6}$, $\frac{1}{7}$, $\frac{1}{8}$, $\frac{1}{9}$, .5, .33, .2, .17, .14, .13, .11

Students shuffle the cards and spread them out face up. For each fraction they find the matching decimal to the nearest hundredth. This may also be played like Concentration.


Percent, Ratio, and Proportion
%
5:2
2:1

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to:
(1) define percent, ratio, and proportion. 5-8
(2) identify the percent sign. 4-5 *5

ACTIVITIES

1. Write this sentence on the chalkboard, "In the apartment building, 31 out of the 100 windows were open."

   Have students write a fraction for the number of windows in the apartment that were open.

   Show that 31/100 may be written as 31% (thirty-one percent).

   Percent means hundredths. The symbol % stands for $\frac{\quad}{100}$.

   We may write a percent as a fraction with denominator of 100.

   31% = 31/100 49% = 49/100 7% = 7/100

   We may write a fraction with denominator of 100 as a percent.

   41/100 = 41% 37/100 = 37% 5/100 = 5%

2. Ratio is one way of comparing two numbers. The order in which the numbers are compared is important; e.g., the ratio of 3 to 4 is not the same as the ratio of 4 to 3. Here are three ways to show a ratio.

   Example: 4 to 3 4:3 4/3

3. A proportion is a statement stating that two ratios are equivalent. The numbers in a proportion are called terms. The terms are given the special names of extremes and means. Cross multiply to check.

Example:

Proportion	Read	Terms	
		Extremes	Means
1/2 = 4/8	1 to 2 is equivalent to 4 to 8	1 and 8	2 and 4
3/5 = 6/10	3 to 5 is equivalent to 6 to 10	3 and 10	5 and 6

Provide students with additional exercises after each definition.

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to name a ratio in several ways such as 4 to 5, 4/5, 4:5. 5-8

ACTIVITIES

1. Express ratios in several ways for the following exercise. There are 4 boys and 8 girls at a party. The ratio of boys to girls is 4 to 8. We can write the ratio as: 4 to 8 4:8 4/8 1/2

   Give the ratios for the following:

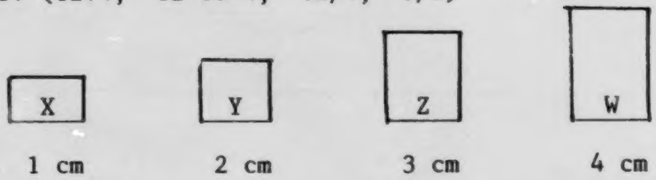
   a. Boys to all those present. (4 to 12; 4:12; 4/12; 1/3)

   b. Girls to all those present. (8 to 12; 8:12; 8/12; 2/3)

   c. All those at the party to girls. (12:8; 12 to 8; 12/8; 3/2)

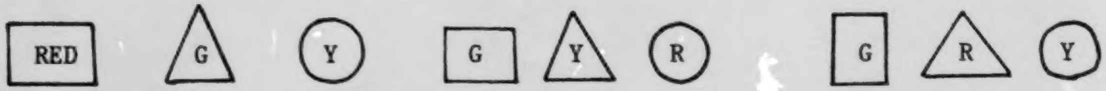
   d. All those at the party to boys. (12:4; 12 to 4; 12/4; 3/1)

2. Complete and fill the table.



Ratio	Edge	Area of 1 face	Surface Area	Volume
W to X	4/1	16/1	16/1	64/1
Y to X	2/1	4/1	4/1	8/1
Z to X	3/1	9/1	9/1	27/1

3. Cut out these shapes from construction paper:



Display the cut-outs and ask for ratios. For example, you might ask for ratios of triangles to circles, circles to red triangles, small triangles to green figures.

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to:

1. Use a ratio to compare the number of objects in two sets. 6-8

2. Use a ratio to compare one number to another. 6-8

ACTIVITIES

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1. Conduct an oral class activity giving the students an opportunity to state ratios suggested by objects inside or outside the classroom.

   Examples:
   1 teacher to 32 students
   1 door to 2 windows
   17 girls to 15 boys
   4 bases to 1 baseball diamond

2. Have students bring in articles which use the terms rate or ratio. Use the articles and any accompanying artwork for a bulletin board. Suggestions may be: population ratios, steering ratio of a car, value of gold or silver, etc.

3. Give the students a list of simple ratios. Have each student draw illustrations to show the ratios.

   Suggested list:
   3 socks to 3 shoes
   1 dime to 3 gum sticks
   1 cat to 6 mice
   2 parents to 4 children

   Then have the students write the ratio for each illustration.

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to express a ratio of two numbers. (Include the comparison of a shaded area of a given figure to the total area.) 6-8

ACTIVITIES

1. Have students discuss the meaning of ratio. Give examples to class to express ratios.

   15 students present, 3 absent - Ratio 15-3

   5 stars to 3 circles - Ratio 5-3

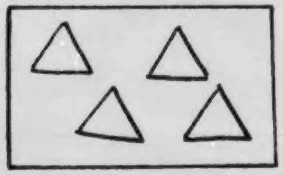
   Write the ratio for each comparison:

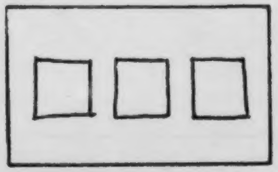
   a. 5 boys to 6 girls (5 to 6)

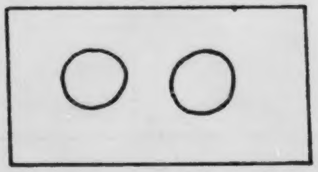
   b. 4 for the price of 3 (4 to 3)

   c. 6 stars to 5 keys (6 to 5)

2.



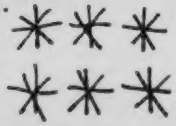




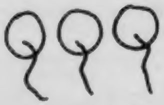
   a. Draw stars so that the ratio of triangles to stars is 4-5.
   b. Draw stars so that the ratio of squares to stars is 3-1.
   c. Draw stars so that the ratio of circles to stars is 2-6.

3. Write the ratio for each comparison.

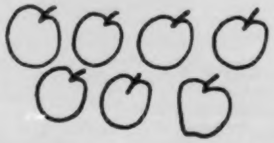
A.



B.



C.



(1) A to B
(6-3)

(2) A to C
(6-7)

(3) C to A
(7-6)

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to recognize and use ratios in map reading. 7-9 *9

ACTIVITIES

1. The scale map at right tells you that 1 inch on the map represents 10 miles.

What is the straight-line distance in inches from Benton to Morrow? __________ Find the missing distance by using the cross-product method.

The four steps of the cross-product method are:

a. $\frac{1}{10} = \frac{3}{x}$

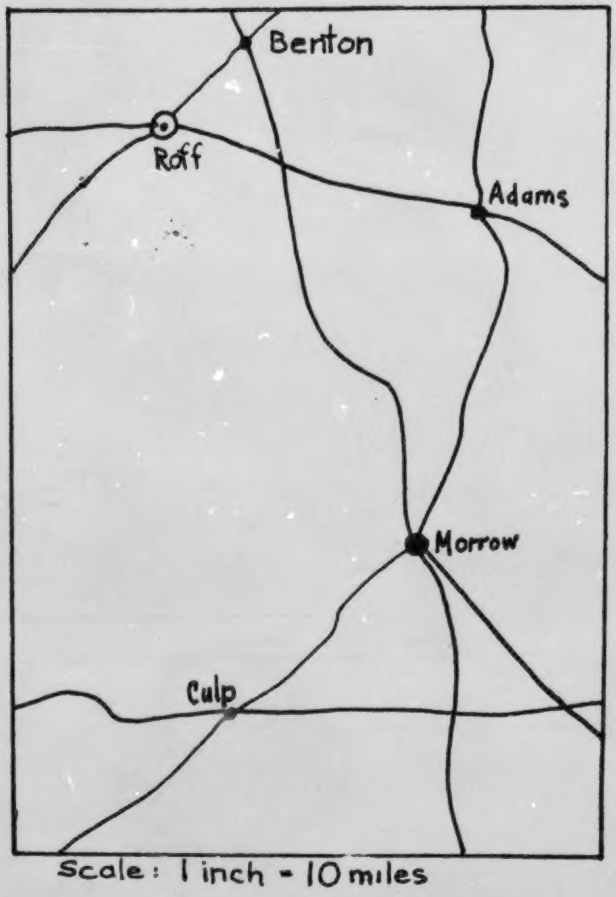
b. $1x = 30$

c. $\frac{1x}{1} = \frac{30}{1}$

d. $x = 30$

What is the straight-line distance from Adams to Morrow? from Benton to Roff? from Culp to Adams?

Add a new imaginary town to the map. Name a town after yourself or your friends. Swap with a neighbor and determine the distance from the other towns to the town you named.



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2. Have the student use graph paper to make a scale drawing of a wall in your classroom. Follow these steps:

   a. Make a rough drawing of a wall.

   b. Measure the length and the width of the wall and any window, chalkboards, bulletin boards, and doors in the wall. Record these measures on your rough drawing.

   c. Compare the length of the graph paper with the length of the wall. Choose a scale to fit the graph paper. Write the scale at the bottom of your graph paper.

   d. Draw the outline of the wall using the scale you chose. Draw all other objects on the wall in the proper places as measured.

3. Distribute Louisiana Road Maps to the students. Have them find the legend. Call attention to the symbols used for interstate, state, and parish highways. Have the students use the maps to plan a trip from their hometown to a place they want to visit. Have them include the roads they would travel, the total number of miles traveled, where they would stop for an evening's rest, and approximate cost of the trip including gas, food, lodging, and other expenses.

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to simplify ratios and determine whether two given ratios are equivalent. 6-8

ACTIVITIES

1. Review the fact that dividing both terms of a fraction by the same number (other than 0) will yield an equal fraction. Write on the chalkboard:

$$\frac{24}{32} = \frac{24\div2}{32\div2} = \frac{12}{16} \qquad\qquad \frac{24}{32} = \frac{24\div8}{32\div8} = \frac{3}{4}$$

Divide to find ratios equivalent to $\frac{12}{96}$.

$$\begin{array}{cccccc} \frac{12\div1}{96\div1} & \frac{12\div2}{96\div2} & \frac{12\div(3)}{96\div(3)} & \frac{12\div(4)}{96\div(4)} & \frac{12\div(6)}{96\div(6)} & \frac{12\div(12)}{96\div(12)} \\ \downarrow & \downarrow & \downarrow & \downarrow & \downarrow & \downarrow \\ \left(\frac{12}{96}\right) & \left(\frac{6}{48}\right) & \left(\frac{4}{32}\right) & \left(\frac{3}{24}\right) & \left(\frac{2}{16}\right) & \left(\frac{1}{8}\right) \end{array}$$

2. For each of the following, find the missing numerals so that the ratios are equivalent.

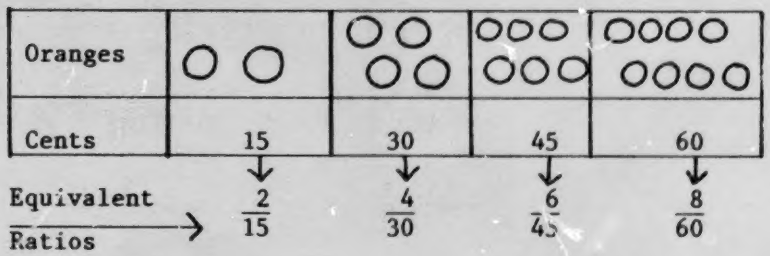
A. $\frac{2}{1}$, $\frac{4}{2}$, $\underset{(3)}{\frac{6}{a}}$, $\underset{(4)}{\frac{8}{b}}$, $\overset{(10)}{\frac{c}{5}}$, $\frac{12}{d}$

D. $\underset{(16.8)}{\frac{3.28}{a}}$, $\frac{1.64}{8.4}$, $\overset{(0.82)}{\frac{b}{4.2}}$, $\underset{(2.1)}{\frac{0.41}{c}}$

B. $\frac{100}{150}$, $\overset{(50)}{\frac{a}{75}}$, $\underset{(30)}{\frac{20}{b}}$, $\overset{(10)}{\frac{c}{15}}$, $\underset{(6)}{\frac{4}{d}}$

C. $\frac{8.8}{1.6}$, $\underset{(0.8)}{\frac{4.4}{a}}$, $\overset{(2.2)}{\frac{b}{0.4}}$, $\underset{(0.2)}{\frac{1.1}{c}}$

3.

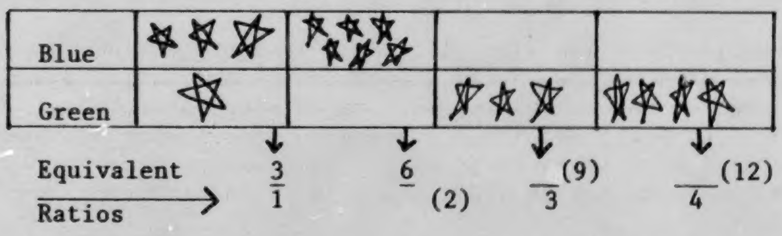

Oranges
Cents
15
30
45
60
Equivalent Ratios
2/15
4/30
6/45
8/60

Examine the diagram with the students. Ask what 2 (oranges) was multiplied by to arrive at each successive first term of the ratios. Ask what 15 (cents) was multiplied by to arrive at each successive second term of the ratios. Then write the equivalent ratios, showing this multiplication.

$$\frac{2}{15} = \frac{2 \times 2}{15 \times 2} = \frac{4}{30} \qquad \frac{2}{15} = \frac{2 \times 3}{15 \times 3} = \frac{6}{45}$$

$$\frac{2}{15} = \frac{2 \times 4}{15 \times 4} = \frac{8}{60} \qquad \frac{2}{15} = \frac{4}{30} = \frac{6}{45} = \frac{8}{60}$$

Have the students fill in the following diagram.


Blue
Green
Equivalent Ratios
3/1
6/
(2)
/3 (9)
/4 (12)

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to solve a proportion. 5-9

ACTIVITIES

1. Make up a game board with a variety of instructions on the board: move back or forward, take more turns, lose a turn, etc. Make 50-60 cards with proportions on them that have a missing term. The missing term should be somewhere between 1 and 15. Let the students play the game by using markers, drawing cards, solving for the missing number in the proportion, then using that number to determine how far they are to move their marker. When they land on a square they are to follow the instructions on that square. Play continues until one student crosses the finish line.

2. Let the students use a calculator to solve these proportions.

a. $\frac{258}{486} = \frac{n}{405}$ 215

b. $\frac{1003}{1121} = \frac{34}{n}$ 38

c. $\frac{23}{29} = \frac{37.95}{n}$ 47.85

d. $\frac{1\frac{5}{6}}{2\frac{1}{3}} = \frac{n}{1\frac{3}{4}} = 1\frac{3}{8}$

e. $\frac{216}{198} = \frac{1296}{n}$ 1188

f. $\frac{2\frac{1}{4}}{3\frac{5}{8}} = \frac{13\frac{1}{2}}{n} = 48\frac{5}{16}$

g. $\frac{315}{398} = \frac{n}{1592}$ 1260

h. $\frac{195}{349} = \frac{n}{1396}$ 780

3. Have students complete the proportions to find the number of drops of food coloring needed to produce the desired color.

pink	$\frac{4\text{ white}}{1\text{ red}}$	$\frac{20\text{ white}}{5\text{ red}}$
orange	$\frac{2\text{ yellow}}{5\text{ red}}$	$\frac{6\text{ yellow}}{15\text{ red}}$
green	$\frac{3\text{ yellow}}{4\text{ blue}}$	$\frac{6\text{ yellow}}{8\text{ blue}}$
purple	$\frac{6\text{ blue}}{8\text{ red}}$	$\frac{24\text{ blue}}{32\text{ red}}$

1071 1072

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to tell if a proportion is true. 6-8

ACTIVITIES

1. Give the students a series of ratios. Have them find all the equivalent ratios in each group:

   a. [✓ $\frac{1}{2}$,] $\frac{2}{3}$, [✓ $\frac{5}{10}$,] $\frac{4}{9}$, $\frac{5}{5}$, [✓ $\frac{2}{4}$,] $\frac{4}{7}$

   b. $\frac{6}{8}$, [✓ $\frac{1}{12}$,] [✓ $\frac{3}{36}$,] $\frac{8}{12}$, [✓ $\frac{2}{24}$,] $\frac{5}{9}$, $\frac{15}{18}$, [✓ $\frac{4}{48}$]

   c. [✓ $\frac{4}{12}$,] [✓ $\frac{2}{6}$,] $\frac{4}{8}$, [✓ $\frac{3}{9}$] $\frac{6}{17}$, [✓ $\frac{5}{15}$,] [✓ $\frac{1}{3}$,] $\frac{7}{20}$

2. Write ratio and proportion problems on cards. In order to find the answers, students must write the proportion for each problem and determine whether it is true. For example:

   a. The ratio of dimes to pins is 3 to 1. Will 6 dimes pay for 3 pins?

      3/1 = 6/3 NO

   b. The ratio of dogs to bones is 2 to 3. There are 10 dogs. Are there 15 bones?

      2/3 = 10/15 YES

   c. The ratio of records to students is 11 to 2. There are 495 records. Are there 85 students?

      11/2 = 495/25 NO

   d. The ratio of dollars to bikes is 393 to 3. Will $3,537 buy 27 bikes?

      393/3 = 3537/27 YES

1073

1074

3. Write proportions such as the ones below on separate cards. Help students compare the cross products and place the cards in 2 boxes marked "TRUE" and "NOT TRUE." Mark each card with arrows as shown to help the students multiply the correct numbers, e.g., $\frac{2}{4} \times \frac{4}{8}$

$\frac{2}{3} = \frac{6}{9}$ $\frac{1}{2} = \frac{2}{4}$ $\frac{2}{5} = \frac{5}{15}$

$\frac{3}{4} = \frac{12}{16}$ $\frac{1}{3} = \frac{2}{6}$ $\frac{1}{4} = \frac{3}{8}$

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to:
(1) change a decimal to a percent. 5-7 *7
(2) change a percent to a decimal. 5-7 *7

ACTIVITIES

1. Make 15 sets of cards with equivalent decimals and percents, e.g., $\boxed{38\%}$ $\boxed{.38}$ $\boxed{19/50}$. Let the students play Concentration with the set of cards.

2. Make 10 sets of cards with equivalent decimals, percents, and fractions, e.g., $\boxed{.65}$ $\boxed{65\%}$ $\boxed{13/20}$. Let pairs of students play by shuffling the cards and dealing six cards to each student. The remaining cards are stacked face down. Taking turns, the students place down three matching cards in their hands. Then they draw three cards from the stack. If a student does not have three matching cards, he draws one card from the stack and discards one card from his hand. The student with the most sets wins.

3. Give students a 100-square grid. Write the following on cards:

Red	14%	Yellow	19%	Blue	16%
Orange	12%	Green	15%	Purple	7%
Gold	11%	Brown	3%	Black	3%

Students take turns drawing a card and coloring the grid according to what is on the card. The activity may be repeated to make different designs.

1077 1078

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to change common fractions with denominators of 2, 3, 4, 5, 8, 10, 20, 25, 50 and 100 to percents. 5-7 *7

ACTIVITIES

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1. Have the students fill in tables such as the following to help them remember fraction-percent relationships:

FRACTION	DECIMAL	PERCENT	FRACTION	DECIMAL	PERCENT
1/2	(.5)	(50%)	3/5	(.6)	(60%)
3/4	(.75)	(75%)	9/10	(.9)	(90%)
4/5	(.8)	(80%)	17/20	(.85)	(85%)
7/10	(.7)	(70%)	7/25	(.28)	(28%)
9/20	(.45)	(45%)	47/50	(.94)	(94%)
23/25	(.92)	(92%)	1/3	(.33 1/3)	(33 1/3%)
40/50	(.8)	(80%)	3/8	(.375)	(37.5%)
39/100	(.39)	(39%)	2/3	(.66 2/3)	(66 2/3%)
1/4	(.25)	(25%)	7/8	(.875)	(87.5%)

2. Have each student choose a topic such as hobbies, TV watching, after-school activities and chart how many hours are spent each week on the activity. Then they find what fraction and percent of the week's time is spent on the activities. They may wish to compare with each other and see how their time can be better budgeted.

3. Have the students match the fractions with the percents to find the secret message.

T	M	S	E	U	R	O	A	Y
$\frac{3}{4}$	$\frac{39}{50}$	$\frac{7}{20}$	$\frac{3}{10}$	$\frac{19}{25}$	$\frac{71}{100}$	$\frac{3}{5}$	$\frac{1}{2}$	$\frac{2}{8}$

4	3	1		8	6	7		2	9	8	6	5
Y	O	U		A	R	E		S	M	A	R	T

1. 76%
2. 35%
3. 60%
4. 25%
5. 75%
6. 71%
7. 30%
8. 50%
9. 78%

1081

CONTENT: Percent, Ratio and Proportion

OBJECTIVE: The student will be able to compute to find a percent of a number.

ACTIVITIES

1. Write the following on 12 separate cards:

4% of 600 (24)
8% of 400 (32)
5% of 900 (45)
8% of 900 (72)

6% of 600 (36)
9% of 300 (27)
7% of 500 (35)
12% of 400 (48)

7% of 900 (63)
15% of 200 (30)
8% of 200 (16)
25% of 480 (120)

Have two students shuffle the cards and stack face down between them. Taking turns, they draw two cards and retain the one that would result in the greater number. For example:

$\boxed{4\% \text{ of } 600}$ $\boxed{5\% \text{ of } 900}$

One student records the score, the player with the greater total score after all the cards are drawn wins.

2. Have students take 20% of 100, then 20% of that, then 20% of that, and so on, until their answer is a decimal with four initial zeros to the right of the decimal point. Have them repeat this with 50%, 80% and 90%. Ask what pattern they see and if they would ever get 0 as an answer. (Answers continue to decrease but will never reach zero.) Now have them test 110% to see if it fits the pattern they found. (No answers increase.) Ask them to find the smallest percent for which their pattern does not hold. (100%)

3. Let the students find the answer to the coded riddle. (Why do they wake you at 3:00 A.M. in a hospital?)

Y $20\% \times 40 =$
S $15\% \times 85 =$
G $33\frac{1}{3}\% \times 2703 =$

V $40\% \times 75 =$
T $3\% \times 124 =$
A $10\% \times 18.70 =$

I $45\% \times 58 =$
E $30\% \times 80 =$
P $37\frac{1}{2}\% \times 56 =$

3.72	.8765	901	26.10	30	24	8	.8765	6.93
1.87	12.75	50	24	24	21	26.10	N	901
21	26.10	50	50					

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to change a fraction, mixed number, or ratio to a percent. 6-8 *8

ACTIVITIES

1. Show the students that any fraction may be renamed as a percent by dividing the numerator by the denominator to get a decimal answer in the hundredths place. The decimal answer is then converted to a percent.

$$\frac{3}{5} = 5\,\overset{.60}{\overline{)3.00}} = 60\% \qquad \frac{5}{4} = 4\,\overset{1.25}{\overline{)5.00}} = 125\%$$

Have the students find a percent for each of the following:

$$\frac{3}{4} \quad \frac{8}{15} \quad \frac{9}{10} \quad \frac{16}{21} \quad \frac{4}{5} \quad \frac{5}{16} \quad \frac{7}{12} \quad 1\frac{1}{2} \quad \frac{9}{6} \quad \frac{9}{4} \quad \frac{11}{5} \quad \frac{10}{8} \quad \frac{5}{2} \quad \frac{5}{4} \quad \frac{11}{8} \quad 2\frac{1}{4}$$

2. Remind students that a percent ratio always has 100 as a denominator. Point out that in exercises such as $\frac{3}{8} = \frac{\_\_\_}{100}$, where 100 is not divisible by 8, it is possible to use the cross-products technique to find the missing term:

$$\frac{3}{8} = \frac{n}{100}$$

$$8n = 3 \times 100$$

$$n = \frac{3 \times 100}{8}$$

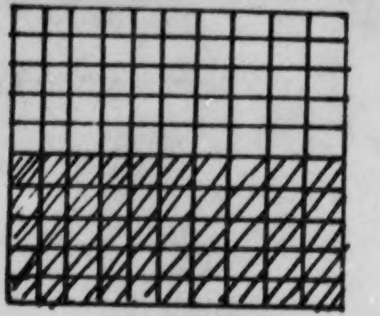
$$n = \frac{300}{8}$$

$$n = 37\tfrac{1}{2}\%$$

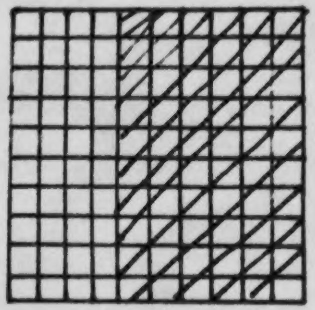
Have students use this method to find percents for these fractions:

$$\frac{1}{3} \quad \frac{5}{6} \quad \frac{5}{8} \quad \frac{1}{6} \quad \frac{1}{8} \quad \frac{21}{23} \quad 1\frac{1}{4} \quad \frac{7}{8} \quad \frac{5}{7} \quad \frac{2}{3} \quad \frac{8}{15} \quad \frac{16}{21} \quad \frac{1}{9} \quad 2\frac{1}{2}$$

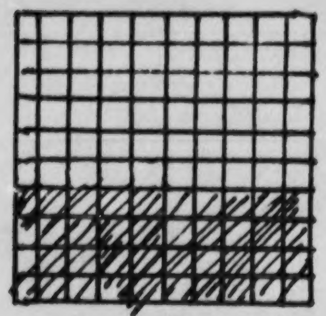
3. Give the students hundred squares as shown. Have them shade in fractions with a denominator of 100 or one which will divide 100, then write the percent for the shaded area. For example:



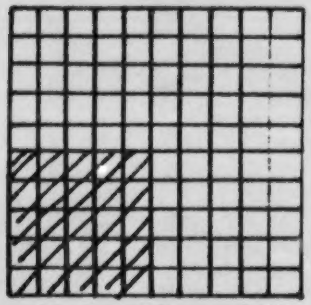
$\frac{50}{100} = \underline{50\%}$



$\frac{6}{10} = \frac{60}{100} = \underline{60\%}$



$\frac{2}{5} = \frac{40}{100} = \underline{40\%}$



$\frac{1}{4} = \frac{25}{100} = \underline{25\%}$

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to change percent to mixed numbers or fractions. 6-8 *8

ACTIVITIES

1. Show the students newspaper advertisements involving percents. Remind them that percent means hundredths or per hundred. Discuss with them that since percent means hundredths, a fraction or mixed number may be obtained by placing the number of the percent over 100 and reducing to lowest terms.

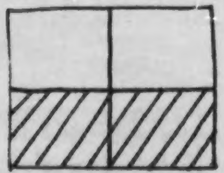
$29\% = \frac{29}{100}$ $20\% = \frac{20}{100} = \frac{1}{5}$ $350\% = \frac{350}{100} = 3\frac{1}{2}$ $528\% = \frac{528}{100} = 5\frac{7}{25}$

2. Have students name five decimals and/or fractions below whose percents total 100%.

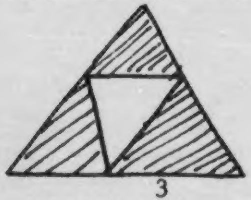
.035 .07 $\frac{1}{10}$ $\frac{1}{8}$

.15 .5 $\frac{6}{25}$ $\frac{21}{50}$

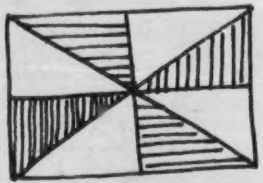
3. Give the students several shapes which have been partially shaded in. Show what percent is shaded. Have the students write the fraction for the shaded area.



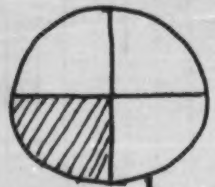
50% = $\frac{1}{2}$



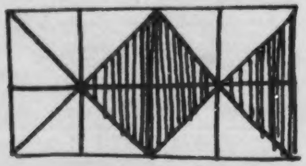
75% = $\frac{3}{4}$



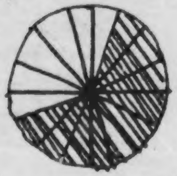
50% = $\frac{1}{2}$



25% = $\frac{1}{4}$



37½% = $\frac{3}{8}$



62½% = $\frac{10}{16}$ or $\frac{5}{8}$

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to use decimal fractions and fractions to compute with percent.

6-8

ACTIVITIES

---

1. Make a set of 30 cards. Ten cards have percents, ten cards have decimals that are equal to the percents and ten cards have fractions that are equal to the percents. Have students find 3-way matches - percent, fraction, and decimal.

2. Give the students several groups of fractions. Have them write decimal fractions and percents for each. Then they should write the percents in order from least to greatest.

A. $\frac{3}{25}$ $\frac{8}{10}$ $\frac{73}{100}$ 12%, 80%, 73%
12%, 73%, 80%

B. $\frac{2}{5}$ $\frac{2}{10}$ $\frac{6}{25}$ 40%, 20%, 24%
20%, 24%, 40%

C. $\frac{4}{20}$ $\frac{1}{4}$ $\frac{2}{20}$ 20%, 25%, 15%
15%, 20%, 25%

3. Give each student a hundreds square. Have them create designs by coloring the square according to the following percentages.

Red	25%	Purple	15%
White	14%	Green	12%
Blue	8%	Orange	9%
Yellow	11%	Black	6%

Have them write the decimal fractions and fractions for the percentages.

1091 1092

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to express a percent as a ratio whose denominator is 100. 6-8

ACTIVITIES

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1. Discuss the meaning of the word percent. Elicit the idea that we can think of percent as meaning "for each 100" or "out of 100." Thus, "17 percent" means "17 out of 100" or "17 for each 100."

   Write each percent as a ratio.

   a. 6% (6 out of 100 or 6/100)
   b. 23% (23 out of 100 or 23/100)
   c. 74% (74 out of 100 or 74/100)
   d. 19% (19 out of 100 or 19/100)
   e. 47% (47 out of 100 or 47/100)

2. Since a dollar is 100 cents, students can use percents to compare a number of cents to 100 cents or 1 dollar. Have them express amounts of change less than a dollar as a percent of 1 dollar and then as a ratio. For example, 23¢ is 23% of a dollar or 23/100.

   a. 1 nickel (5% or 5/100)
   b. 1 quarter (25% or 25/100)
   c. 1 quarters, 2 dimes, 1 nickel (50% or 50/100)
   d. 1 quarter, 3 dimes, 4 nickels, 2 pennies (77% or 77/100)

3. Prepare a ditto worksheet that has 5 large squares, each containing 100 small squares. Ask the students to shade the number of squares given below, give the percent and the ratio.

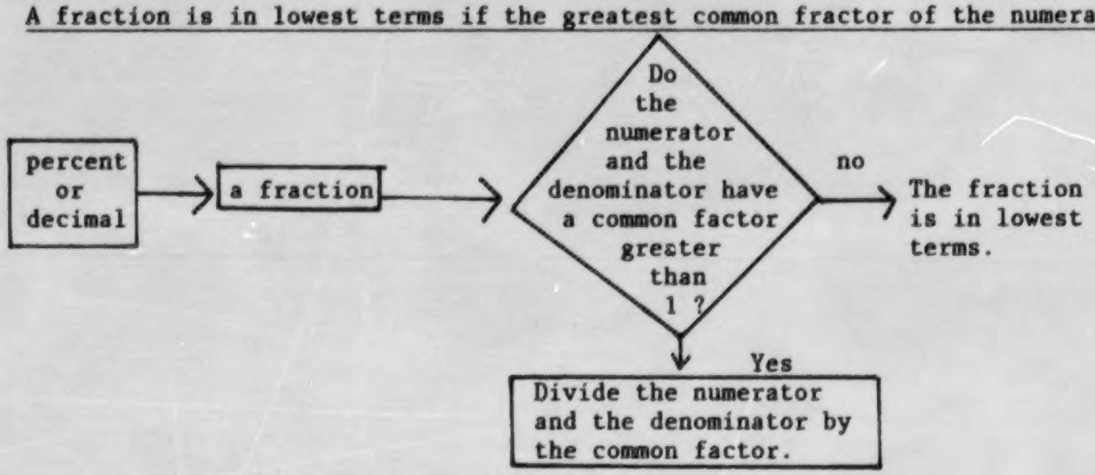
   a. 5 (5% or 5/100)
   b. 10 (10% or 10/100)
   c. 20 (20% or 20/100)
   d. 43 (43% or 43/100)
   e. 66 (66% or 66/100)

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to rename a percent or a decimal as a ratio in lowest terms; express a ratio as a percent, fraction or decimal and rename a percent or decimal to a ratio. 6-8

ACTIVITIES

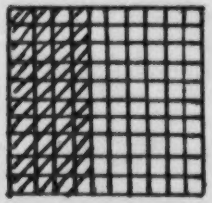
1. A fraction is in lowest terms if the greatest common fractor of the numerator and denominator is 1.


percent or decimal
a fraction
Do the numerator and the denominator have a common factor greater than 1 ?
no
The fraction is in lowest terms.
Yes
Divide the numerator and the denominator by the common factor.

Example: Find the lowest-terms fraction for 0.75.

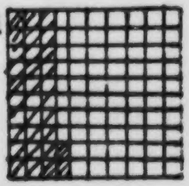
$$\boxed{0.75} \longrightarrow \boxed{\frac{75}{100}} \longrightarrow \boxed{\frac{75 \div 25}{100 \div 25}} \longrightarrow \boxed{\frac{3}{4}}$$

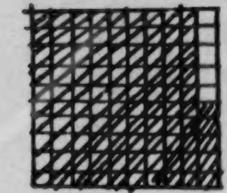
*Write the percent of the square that is shaded as a ratio in lowest terms.

A.


A. $40\% = \frac{40}{100} = \frac{40 \div 20}{100 \div 20} = \frac{2}{5}$

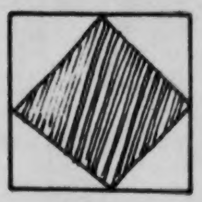
B. $32\% = \frac{32}{100} = \frac{32 \div 4}{100 \div 4} = \frac{8}{25}$

B.


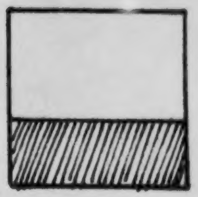


C. $95\% = \frac{95}{100} = \frac{95 \div 5}{100 \div 5} = \frac{19}{20}$

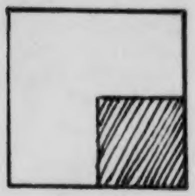
2. Write the percent of the square that is shaded as a ratio in lowest terms.



A. $50\% = \frac{50}{100} = \frac{50 \div 50}{100 \div 50} = \frac{1}{2}$



B. $30\% = \frac{30}{100} = \frac{30 \div 10}{100 \div 10} = \frac{3}{10}$



C. $25\% = \frac{25}{100} = \frac{25 \div 25}{100 \div 25} = \frac{1}{4}$

3. Twenty-five percent of the students in the class are boys. What is the lowest-terms ratio of the boys in the class?

$25\% = \frac{25}{100} = \frac{25 \div 25}{100 \div 25} = \frac{1}{4}$

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CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to find a number when a percent of it is known. 6-8 *8

ACTIVITIES

---

1. Write an equation such as 18 = 60% x n. Read the equation as "18 is 60% of what number?" or as "60% of what number is 18?" Help students solve the equation twice, first writing 60% as a decimal, and then as a fraction.

$$n = 18 \div .6 \qquad n = 18 \div \frac{3}{5}$$

$$n = 30 \qquad n = \frac{90}{3}$$

$$n = 30$$

Have the students choose which method they wish to use to solve the following:

a. 35% of what number is 7?
b. 28% of what number is 21?
c. 60% of what number is 21?
d. 42% of what number is 252?
e. 1% of what number is 6?

2. Find a newspaper ad which quotes a sale price. Have students find the original price when this sale price is 90% of the original price; 83% of the original price; 77% of the original price; and 65% of the original price.

3. Make a set of dominoes with the pairs listed below on the faces. The game is played like dominoes. The first one to play all his dominoes wins.

10	20% of 200
25	___% of 50 is 5
40	40% of 25
50	30% of ___ is 3
20	___% of 35 is 7
75	40% of 50
80	80% of ___ is 16
100	___% of 32 is 8
20	50% of 50
10	4% of ___ is 1
75	___% of 30 is 12
25	60% of ___ is 24
100	10% of 400 is ___
40	___% of 12 is 6
50	20% of ___ is 10
75	5% of 1000
20	___% of 32 is 24
80	60% of ___ is 45
40	25% of 300
40	___% of 10 is 8
100	20% of ___ is 16
10	80% of 100 ___
25	___% of 7 is 7
50	35% of ___ is 35
80	100% of 100

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to find what percent one number is of another. 6-8 *8

ACTIVITIES

1. Have 10 students each write any 2-digit numeral on a card. Put all the cards in a bag. Have a student draw two cards. All students find what percent the lesser number is of the greater number. Continue with the remaining cards.

2. Let the students survey the class to determine things they would like to know about each other. These things may include hobbies, favorite TV show, rock group, color, etc. Use this information to make a chart about the entire class. Then find out what percent of the class chose certain items surveyed.

3. Have the students solve problems of what percent one number is of another by using a calculator and comparing results. Use problems such as the following:

   40% of 50 = 80%
   50% of 100 = 50%
   25% of 500 = 5%
   12% of 16 = 75%
   12% of 48 = 25%
   36% of 45 = 80%
   15% of 25 = 60%
   2% of 20 = 10%

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to solve discount problems. 6-8

ACTIVITIES

1. Put a chart such as the following on the chalkboard. Discuss the column readings and the process for finding the amount of discount and sale price with the students. Have them complete the chart.

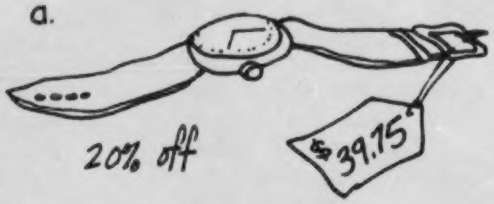
Item	Original Price	Rate of Discount	Discount	Sale Price
Belt	$ 10.00	20%	$ 2.00	$ 8.00
Jeans	18.00	25%	4.50	13.50
Record	8.00	30%	2.40	5.60
Poster	3.00	50%	1.50	1.50
Bike	99.50	17%	16.92	82.58
Shoes	16.95	10%	1.70	15.25
Shirt	13.49	15%	2.02	11.47
Stereo	279.98	18%	50.40	229.58
Car	5,264.32	11%	579.08	4,685.24

2. Ask students to clip sales ads from newspapers and sale catalogs and compute the rate of discount for the items. Have them complete a table similar to the following:

Item	Original Price	Sale Price	Discount	Rate of Discount
Luggage	$ 50.00	$ 40.00	$ 10.00	20%
Calculator	39.86	33.88	5.98	15%
Motorcycle	449.96	337.47	112.49	25%
Gold necklace	187.50	125.00	62.50	33 1/3%
Jacket	52.12	36.08	16.04	31%
Tennis racket	30.00	22.50	7.50	25%
Radio	39.00	26.00	13.00	33 1/3%
Television	687.98	498.65	189.33	28%
Microwave	394.69	363.53	31.16	8%

3. Discuss sales and discounts with the students. Have them collect ads showing discounted items that they would like to buy. Help them find the discount and sale price of each item. Discuss which items are the best buys. A variation might be to compute the discount and sale price of the following items:

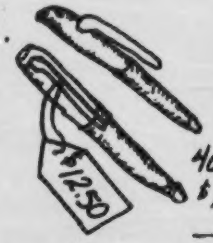
a.



$39.75
x.20
7.9500 discount

$39.75
-7.95
$31.80 sale price

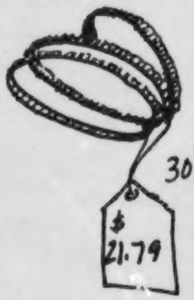
b.



40% off
$12.50
.40
5.00 discount

12.50
− 5.00
$7.50 sale price

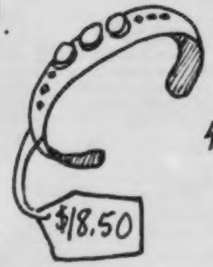
c.



30% off
$21.79
.30
65370

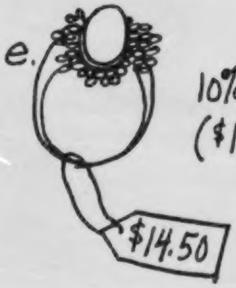
$21.79
− 6.54
$15.25 sale price

d.

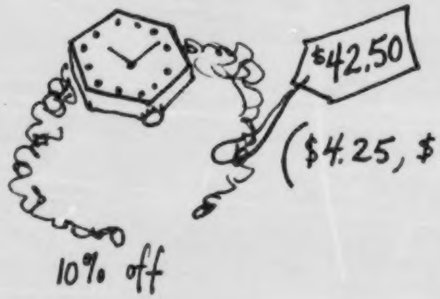


40% off ($7.40, $11.10)

e.



10% off
($1.45, $13.05)



($4.25, $38.25)

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to solve commission problems. 6-8

ACTIVITIES

---

1. Discuss the meaning of commission with the students. Point out common commission practices, such as 6% on sales of residential property - 10% on sales of unimproved land and 3% to 5% on retail sales.

   Have students set up a proportion and solve to find the missing term.

   Example:

   A salesman in a men's store is paid a 3% commission on all sales. If he sells $5,500 worth of merchandise, how much will his commission be?

$$\frac{3}{100} = \frac{n}{\$5500}$$

$$100\ n = 3 \times 5500$$

$$100\ n = 16500$$

$$n = \$165 \longrightarrow \text{commission}$$

2. Have the students find ads in the real estate section of the newspaper where houses and land are listed with a realtor. The students will choose several houses and prices of unimproved land and find out what the commission will be for the realtor and how much the seller will be getting.

3. Review with the students how to find a percent of a number. Have them find out from parents or friends examples of commissions paid and share the examples with the class.

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to find the percent of increase and the percent of decrease. 7-10 *10

ACTIVITIES

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1. Have students complete a table such as the following:

Start	Decrease To	% of Decrease	Start	Increase To	% of Increase
$30	$25	(16-2/3%)	$25	$30	(20%)
12	9	(25%)	9	12	(33-1/3%)
16	8	(50%)	8	16	(100%)
25	20	(20%)	20	25	(25%)
20	16	(20%)	16	20	(25%)
50	30	(40%)	30	50	(66-2/3%)
75	50	(33-1/3%)	50	75	(50%)

2. Give the students a table such as the following. Have them decide which columns would apply to the information given. They are to find the number and percent of increase or decrease and fill in the spaces that apply.

1110

1111

	Number	Sold	Increase		Decrease	
Class	**Last Year**	**This Year**	Number	%	Number	%
Jones	40	50	(10)	(25%)		
Smith	50	70	(20)	(40%)		
Ross	45	40			(5)	(11-1/9%)
Lofton	35	40	(5)	(14-2/7%)		
Kraft	42	28			(14)	(33-1/3%)
Davis	65	80	(15)	(23-1/13%)		
Reynolds	60	30			(30)	(50%)
Lott	50	100	(50)	(100%)		
Wilson	56	70	(16)	(28-4/7%)		

3. Have the students keep a record of the number of minutes a day they spend on homework for one week. Help them compute the daily percentage increase or decrease.

CONTENT: Percent, Ratio, and Proportion

OBJECTIVE: The student will be able to solve simple interest problems using the formula I = PRT. 7-10 *10

ACTIVITIES

1. Discuss the meaning of principal and simple interest. Explain that banks invest the money of their depositors so that the banks can earn money and pay interest. Show students how to take the formula I = PRT and substitute into it to find simple interest. Have them complete charts such as the following:

Principal	Interest at 9% Per Year		
	1 Year	18 Months	2 Years
$ 100	$ (9.00)	$ (13.50)	$ (18.00)
200	(18.00)	(27.00)	(36.00)
300	(27.00)	(40.50)	(54.00)
500	(45.00)	(67.50)	(90.00)
1,000	(90.00)	(135.00)	(180.00)
1,500	(135.00)	(202.50)	(270.00)

2. Have the students find the simple interest rate if they borrow $100 for 2 years and repay the following amounts:

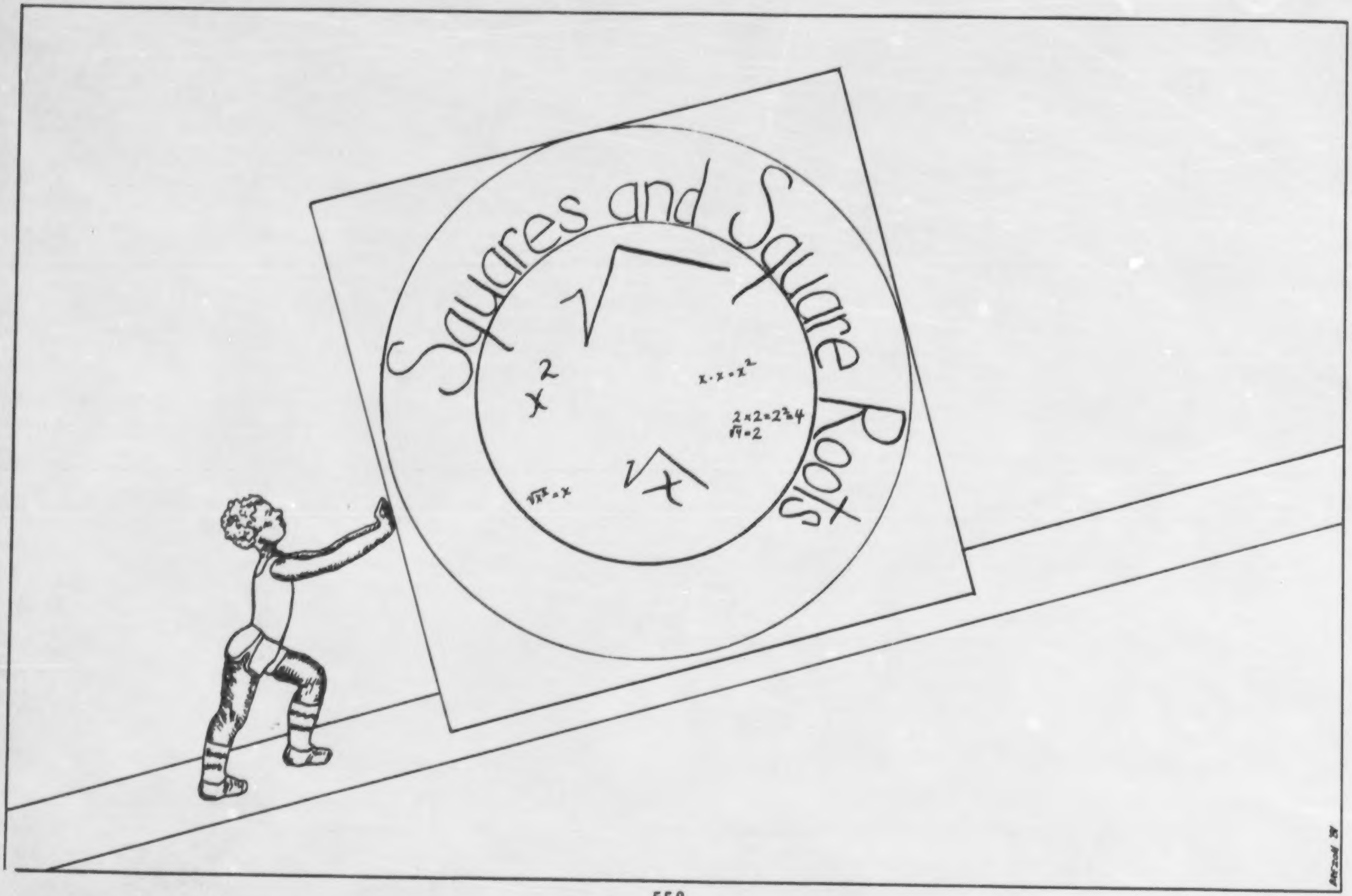
   a. $106.00 (3%)
   b. $110.00 (5%)
   c. $107.50 (3-3/4%)
   d. $120.00 (10%)
   e. $118.50 (9-1/4%)
   f. $108.75 (4-3/8%)
   g. $105.00 (2-1/2%)
   h. $111.50 (5-3/4%)
   i. $114.00 (7%)
   j. $125.00 (12-1/2%)

3. Pretend to give the students $100 to deposit in a savings account. Help them find how much money they would have at the end of one year if the interest paid them was:

a. 1% ($101.00)
b. 2% ($102.00)
c. 4% ($104.00)
d. 6% ($106.00)
e. 10% ($110.00)
f. 3% ($103.00)
g. 9% ($109.00)
h. 5% ($105.00)
i. 8% ($108.00)
j. 7% ($107.00)

1116

1117

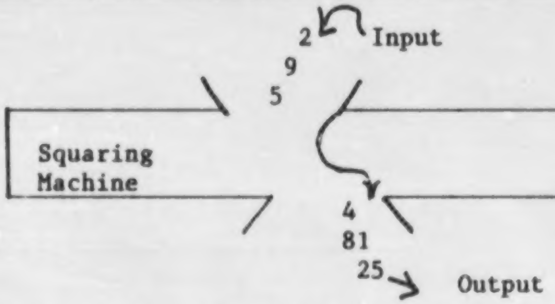

Squares and Square Roots
x^2
$x \cdot x = x^2$
$2 \times 2 = 2^2 = 4$
$\sqrt{4} = 2$
$\sqrt{x^2} = x$
$\sqrt{x}$

CONTENT: Squares and Square Root

OBJECTIVE: The student will be able to compute the square of a number. 6-8 *8

ACTIVITIES

1.



The machine above is a squaring machine. If you put in a number, the square ($\square^2$) comes out. The examples are:

IN	OUT
2	4
9	81
5	25

What will come out if the following numbers are put in?

a. 7 (49)
b. 1 (1)
c. 3.6 (12.96)
d. 12 (144)
e. 0 (0)
f. 1.2 (1.44)
g. 100 (10,000)
h. 5 (25)

2. Have students find the input if the output was as follows:

a. 16 (4)
b. 25 (5)
c. 1.44 (1.2)
d. 0 (0)
e. 100 (10)
f. 9 (3)
g. 1.96 (1.4)
h. 6.76 (2.6)

3. Make a concentration game putting square notations on half the cards and their answers on the other half of the cards.

Example: 1^2 with 1 5^2 with 25

2^2 with 4 12^2 with 144, etc.

CONTENT: Squares and Square Root

OBJECTIVE: The student will be able to find the square root of a number by using the divide and average method and using tables. 7-8

ACTIVITIES

1. Review the definition of square root. Ask students to name the square root of numbers such as 4, 1, 36, and 100.

   Explain the divide and average method of finding the square root of a number. Help them to make the first estimate carefully. For example, when finding the square root of 361, we find two familiar square roots that 361 is between. (Multiples of 10 are easy to use.)

$$\begin{array}{ccc}\sqrt{100} & \sqrt{361} & \sqrt{400}\\ \updownarrow & \updownarrow & \updownarrow\\ 10 & \underline{15} & 20\end{array}$$

   Choose a number between the two familiar numbers.

   Divide by this number.
   Find the quotient to the nearest tenth.

$$\begin{array}{rr} & 24.0\\ 15 & \overline{)361.}\\ & \underline{-30}\\ & 61\\ & \underline{60}\\ & 10\end{array}$$

   Find the average of the quotient and the divisor to the nearest tenth.

$$\frac{15 + 24}{2} = \frac{39}{2} = 19.5$$

   Divide by this number. Find the quotient to the nearest tenth.

$$\begin{array}{rr} & 18.5\\ 91.5 & \overline{)3610.}\\ & \underline{195}\\ & 1660\\ & \underline{1560}\\ & 1000\end{array}$$

   Find the average of the quotient and the divisor to the nearest tenth.

$$\frac{19.5 + 18.5}{2} = \frac{38}{2} = 19$$

   Divide by the average.

$$\begin{array}{rr} & 19\\ 19 & \overline{)361}\end{array}$$

   The divisor and the quotient are equal. When they are equal, you can stop. The square root of 361 is 19.

Have students find the square root of the following numbers:

a. $\sqrt{289}$ (17)

b. $\sqrt{729}$ (27)

c. $\sqrt{1296}$ (36)

d. $\sqrt{625}$ (25)

e. $\sqrt{169}$ (13)

f. $\sqrt{576}$ (24)

g. $\sqrt{1521}$ (39)

h. $\sqrt{2704}$ (52)

2. Have students find the square root to the nearest tenth for numbers such as the following:

a. 490 (22.1)

b. 198 (14.1)

c. 925 (30.4)

d. 1437 (37.9)

e. 3165 (56.3)

f. 2176 (46.6)

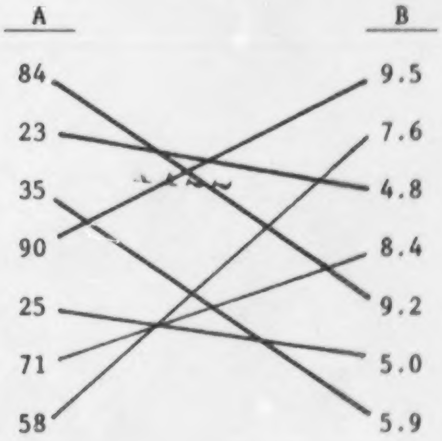
g. 1662 (40.8)

h. 3444 (58.7)

i. 3724 (61.0)

j. 5921 (76.9)

3. Show students how to use a square root table. Have them match column A with column B.



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1125

CONTENT: Squares and Square Root

OBJECTIVE: The student will be able to find the square root of a perfect square. 6-8

ACTIVITIES

1. Make a bulletin board entitled "Help These Numbers Find Their Roots." Scatter the numbers 225, 196, 169, 144, 121, 100, 81, 64, 49, 36, 25, and 16 around on the bulletin board. Ask the students to find the square roots of these numbers. Provide an answer key.

2. Have the students complete the cross number puzzle by finding the square root of each number to the nearest tenth. Write the decimal point with the tenths.

a.5	.2	▨	b.4	.1	▨
.8	▨	c9	.7	▨	d5
▨	e8	.4	▨	f7	.5
g3	.6	▨	h9	.3	▨
.2	▨	i3	.9	▨	i8
▨	k5	.4	▨	l6	.7

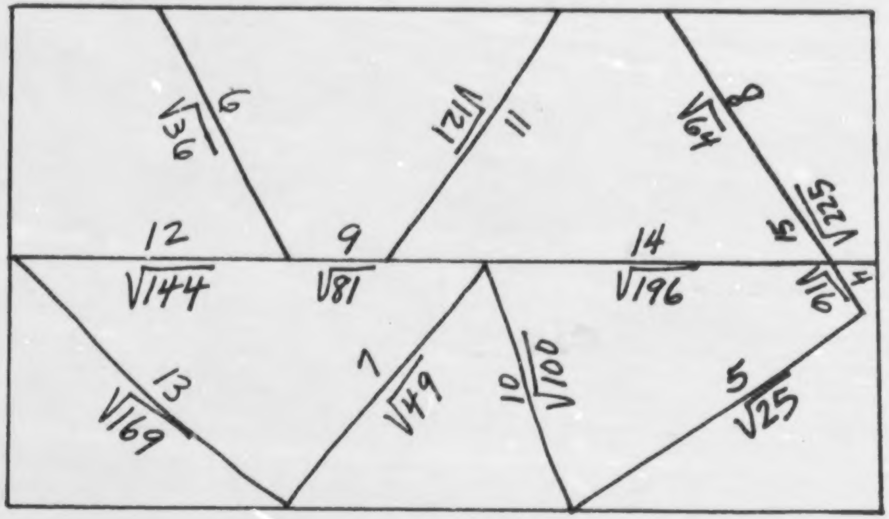
Across:

a.	27	g.	13
b.	17	h.	86
c.	94	i.	15
e.	71	k.	29
f.	56	l.	45

Down:

a.	34	f.	54
b.	22	g.	10
c.	88	h.	98
d.	30	i.	75
e.	74		

3. On a piece of cardboard write several square root equations. Cut the cardboard into puzzle pieces. Have the students put the puzzle together so that the correct solution for each equation shows.


$\sqrt{36}$
6
$\sqrt{121}$
11
$\sqrt{64}$
8
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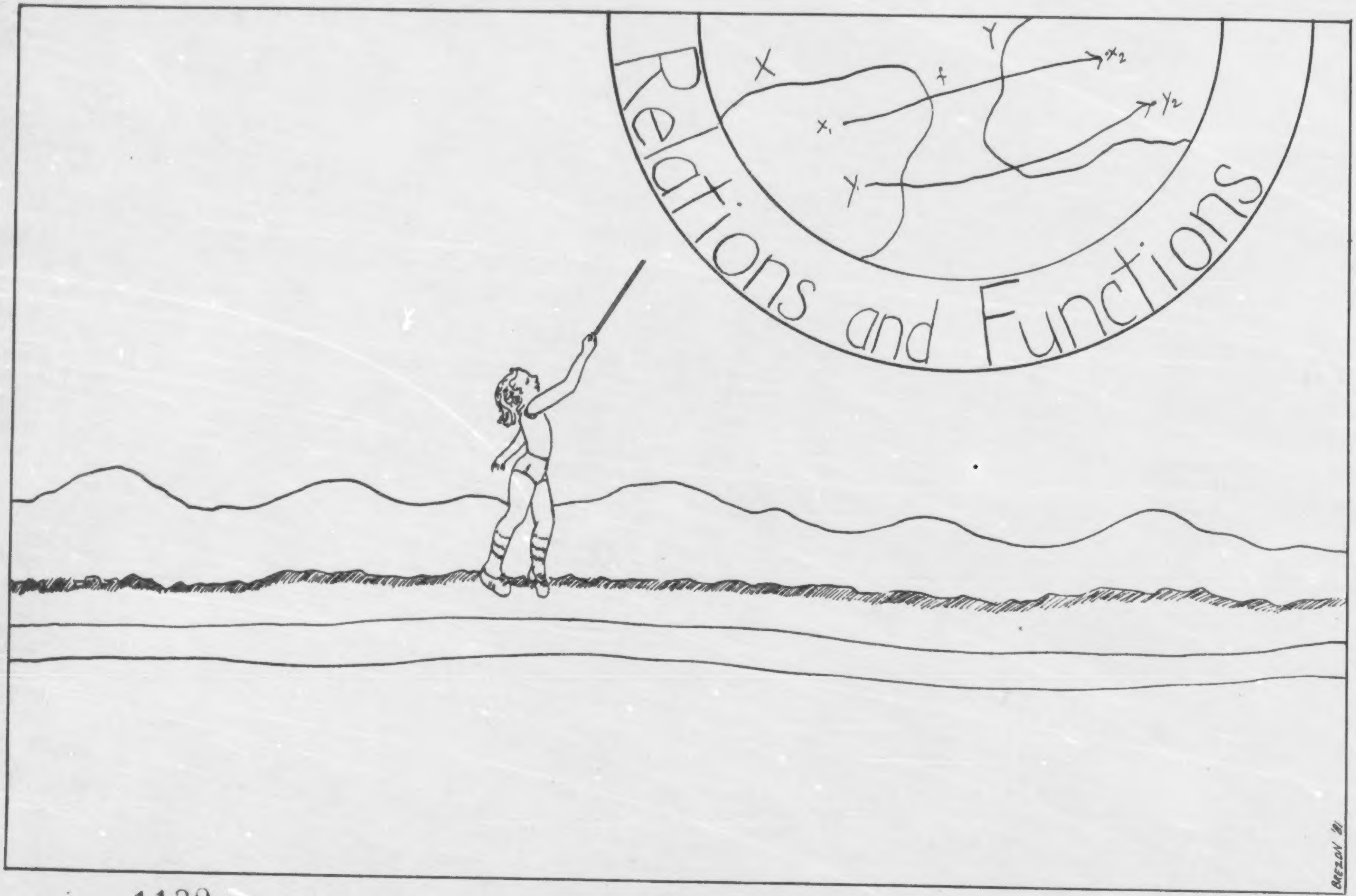

Relations and Functions
X
Y
f
x_1
x_2
y_1
y_2
BREZON '81

CONTENT: **Relations and Functions**

OBJECTIVE: **The student will be able to make and interpret a bar graph.** 2-4

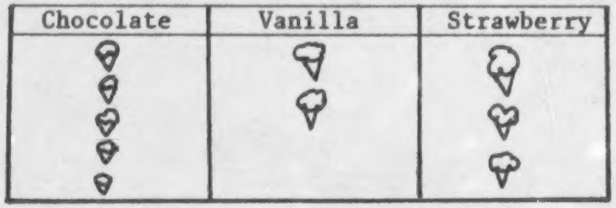
ACTIVITIES

1. Divide the chalkboard, a piece of poster paper or an area of the classroom floor into as many areas as the groups you plan to compare. Ask the students to draw pictures of their answer to the question.

   Sample questions:

   a. Do you like chocolate, vanilla, or strawberry ice cream better?
   b. Are you wearing pants, a skirt, or a dress?
   c. Do you like a banana, an orange, or an apple better?
   d. Would you rather drive a car, a truck, or a rocket?

   Collect the pictures and place them in groups on the graph.



2. Have the students work in small groups and make symbolic graphs. Sample questions may be:

   a. What kind of pet do you have?
   b. Do you like spinach?
   c. Who do you want to be kickball captain?

3. Use real objects to make a graph with the children. You may let the students use their own shoes to answer questions such as:

   a. Are you wearing shoes or boots?
   b. Are the soles of your shoes smooth or bumpy?
   c. Do your shoes have laces, buckles, or are they plain?

CONTENT: Relations and Functions

OBJECTIVE: The student will be able to record data from a bar graph. 2-4

ACTIVITIES

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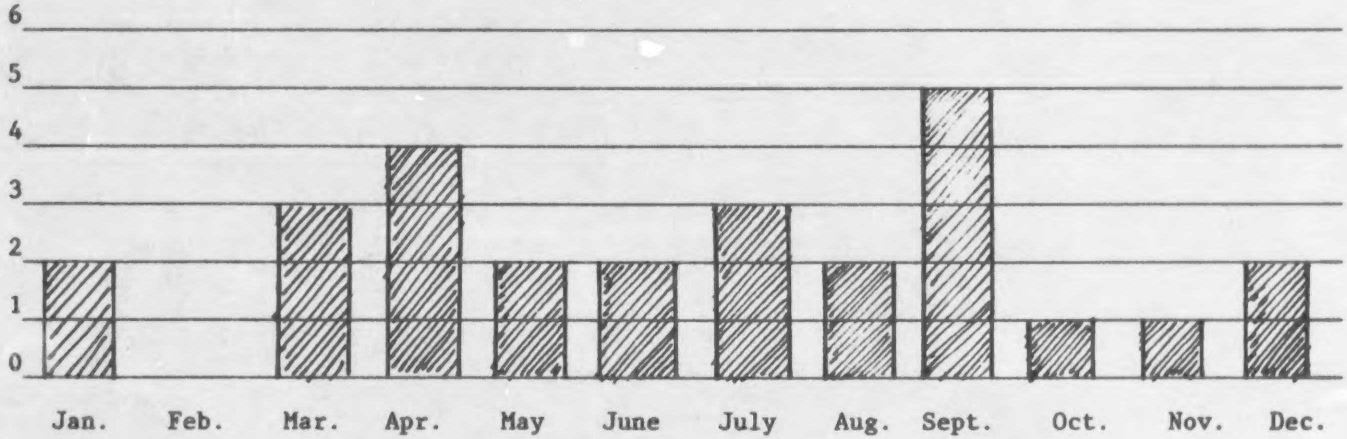
1. Have students answer the following questions from the bar graph below.



The graph shows that there are two birthdays in January.

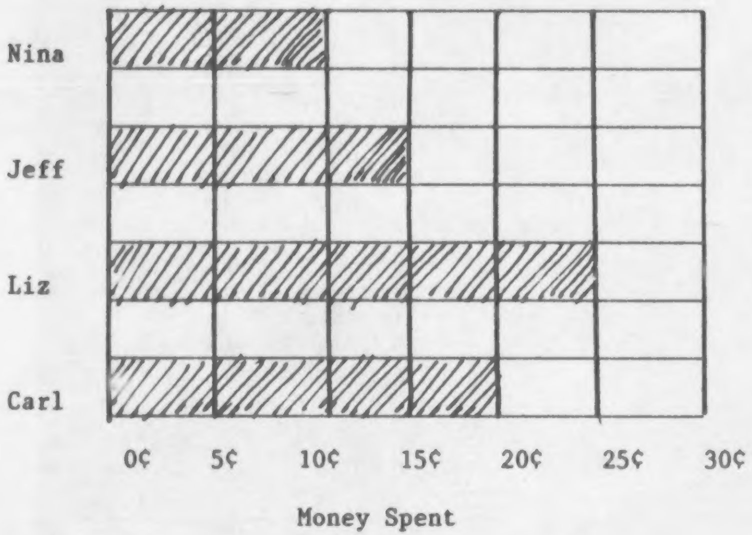
a. How many birthdays are in March?
b. How many birthdays are in August?
c. Are there more birthdays in July or August?
d. Which month has the most birthdays?
e. Which month has 4 birthdays?
f. How many months have 2 birthdays?
g. Which month has 0 birthdays?
h. How many children are in the class?
i. Which month has twice as many birthdays as May?

2. Have the students write down the information described in the graph in activity 1.

3. Have students complete the following exercise:

The third grade class had a bake sale.
The bar graph shows how much money some of the students spent.

Each ☐ equals 5¢.



1. Nina spent ☐ .
2. Jeff spent ☐ .
3. Liz spent ☐ .
4. Carl spent ☐ .

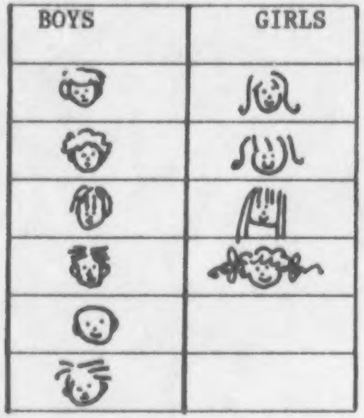
1136

CONTENT: Relations and Functions

OBJECTIVE: The student will be able to interpret, construct, and record data presented in pictorial form. 2-4 *4

ACTIVITIES

1. Distribute small squares to the students; have them draw themselves. Collect the pictures and make a pictograph showing the number of boys and girls in the class.



Use the sample to introduce the idea of pictographs. Pictographs help us compare groups by using pictures of the real object. Ask questions to assist students in interpreting the graph:

(1) What is being compared?
(2) Which group has more? less?
(3) How does the pictograph help you compare things?

As a group, construct a pictograph to illustrate some other data:

Example 1:

Did you walk or ride to school today?									
Walk									
Ride									

1138

1137

Have each student draw feet or a wheel to illustrate whether he walked or rode.
Example 2: Distribute colored candy mints. Make a pictograph showing the color each student had.

2. Have students collect data to make an interesting pictograph. Each student must develop an organized method for collecting his data (personal interviews, questionnaires, etc.), decide on a format for presenting it, and formulate questions to assist other students in interpreting it.

   Sample topics are:

   a. favorite brands of toothpaste, soap, etc.
   b. kinds of pets
   c. favorite TV shows
   d. number of siblings among classmates

3. Construct graphs of real people or objects. Graphs may be made by putting masking tape squares on the floor or by using large sheets of paper. As a group, make graphs of things such as the following:

   a. people with blue eyes, brown eyes, green eyes
   b. shoes with laces or buckles
   c. favorite fruits - apple, orange, banana
   d. scary or friendly masks for Halloween

CONTENT: Relations and Functions

OBJECTIVE: The student will be able to:
1. interpret simple data from a simple bar graph. 4-6 *6
2. interpret data from a simple line graph, pictograph or circle graph. 4-7 *7

ACTIVITIES

1. Have the students gather information on topics such as kinds of favorite foods of classmates, favorite sports, kinds of library books checked out, or kinds of pets that classmates have. Then have them use the information to make an appropriate graph.

2. Have the students prepare a chart having the twelve months of the year across the top. Let them find out from all the students in the class the month of their birthday and graph this information onto the chart. Discuss the data on the completed graph.

3. Have a large calendar of the month. Each day have a child record whether the weather is sunny, rainy or cloudy. At the end of the month, elicit from the children the number of sunny days, rainy days, and cloudy days.

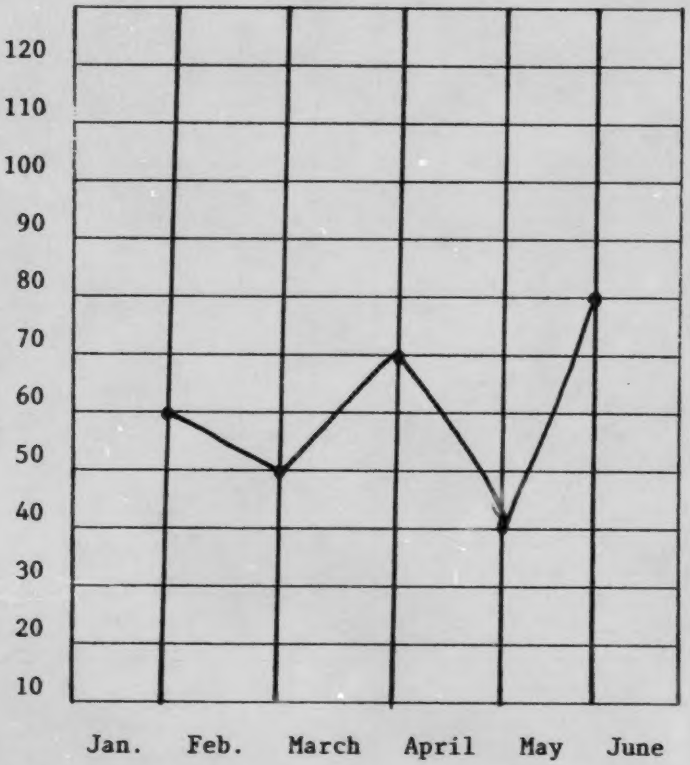
CONTENT: Relations and Functions

OBJECTIVE: The student will be able to interpret information from a line graph. 6-8

ACTIVITIES

1. Use the graph to answer the questions.

This graph shows Sue's weight from January through June.



1. In which month did she weigh most? ___________

2. In which month did she weigh the least? ________

3. In which months did she weigh the same? ________

Did she lose or gain weight from April to June? ________

1143

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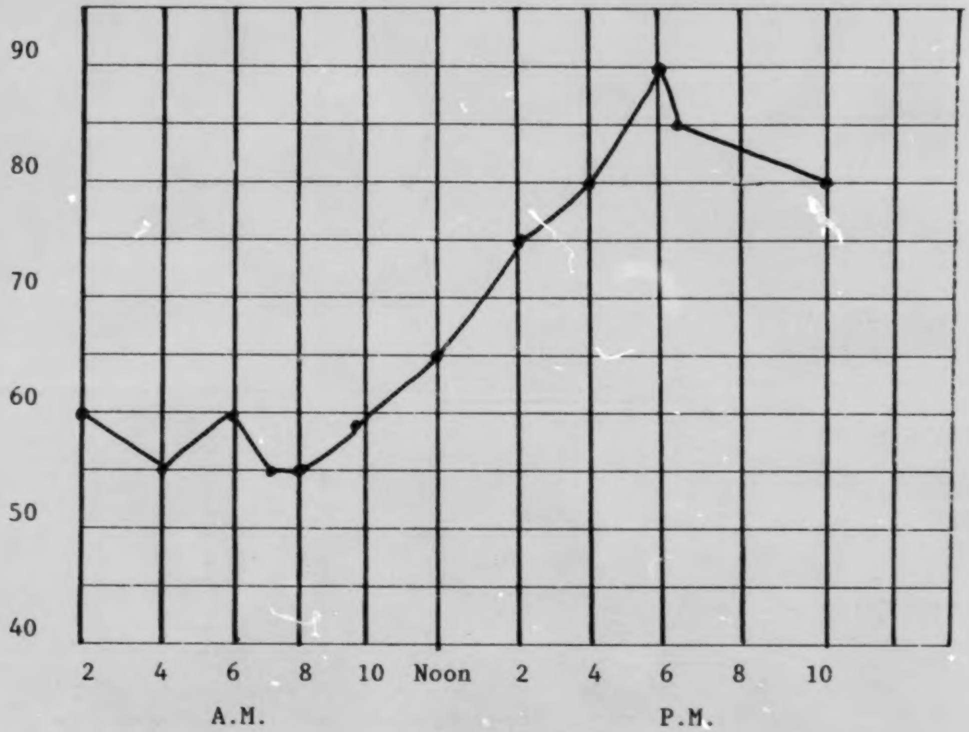
2. Use the line graph below to answer the questions.

Hourly temperatures August 25, 1970 - Baton Rouge, LA



(1) What was the highest temperature on August 25? ________

(2) What was the lowest temperature? When did the lowest temperature occur? ________

(3) How much did the temperature rise between 8:00 A.M. and noon? ________

(4) How many degrees did the temperature drop between 6:00 P.M. and 10:00 P.M.? ________

3. The graph below shows the number of boys and girls enrolled in Park Elementary School from August of 1968 through May 1978.

(1) How many girls were enrolled in 1968? ________

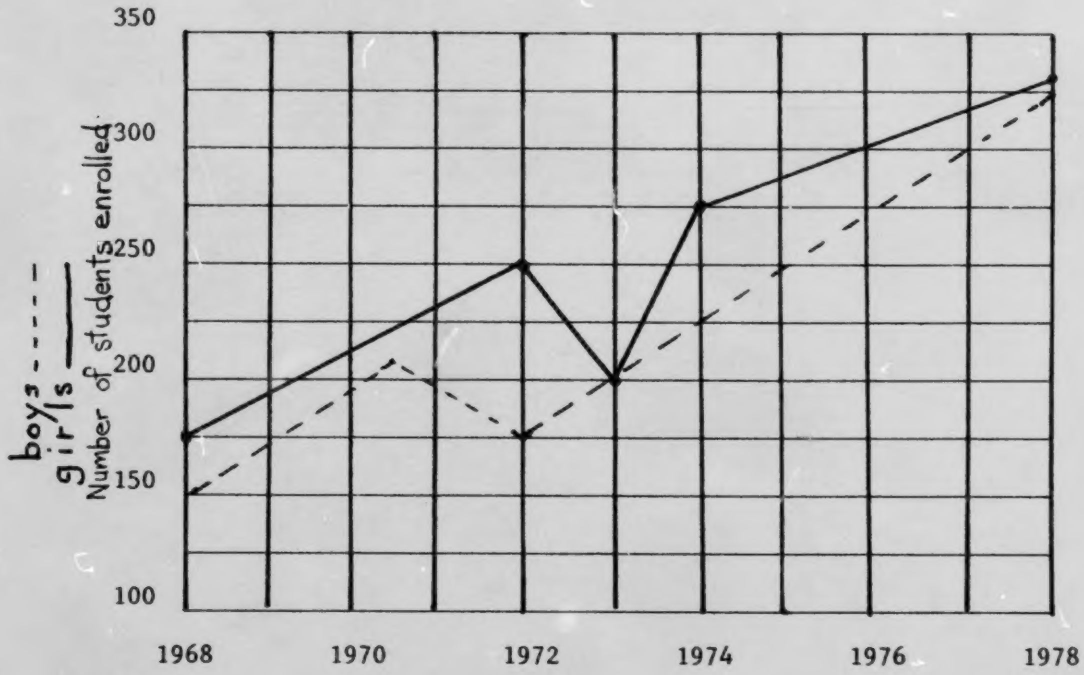
(2) Were there more girls than boys enrolled in 1974? ________

(3) How many boys were enrolled in 1974? _________

(4) Which group showed the greatest growth? __________

(5) How many girls were enrolled in 1972? _________

(6) Which group showed the largest enrollment in 1978? _______



CONTENT: Relations and Functions

OBJECTIVE: The student will be able to interpret, construct, and record simple data from a simple bar graph. 5-8

ACTIVITIES

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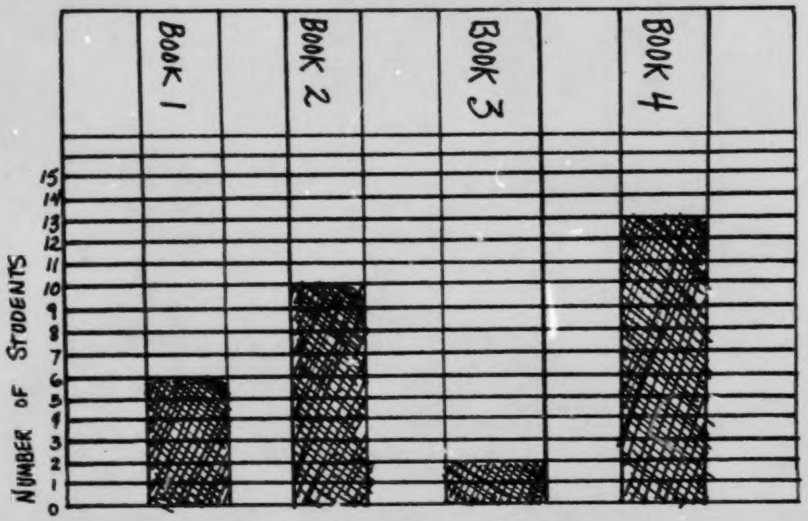
1. Read four books to the class. Let students vote on their favorite book. Make a bar graph of the results to use in introducing the bar graph.



Discuss the graph, the scale used, and how many units each square represents. Discuss the advantages of the bar graph over the pictograph in showing large amounts of data. Each square could represent 100 people instead of one person. Examine the graph to see which book was most popular, how many people like each book, etc.

2. Have students look for bar graphs in the newspaper and national news magazines. Cut them out and formulate questions to use in data interpretation. Keep a list of topics represented by these graphs, and make a bar graph to show the topics.

1149

3. Have students make cubes from half-pint milk cartons. Each child decorates his cube and puts his name or picture on it. Let students make bar graphs by stacking the cubes. Students may show class birthdays in each month, favorite sports, favorite subjects, etc. After students make the cube graph, help them record the results on graph paper.

CONTENT: Relations and Functions

OBJECTIVE: The student will be able to construct a pictograph, line graph and a circle graph from given data. 7-10 *10

ACTIVITIES

---

1. Have students construct the appropriate graph to show the following:

Five children, Ellen, Sandy, Carl, Wayne and Alice, attend Goodwood School. Make a graph to show how far their homes are from school.

Ellen - 9 blocks
Sandy - 1 block
Carl - 6 blocks
Wayne - 8 blocks
Alice - 2 blocks

2. Different people have different budgets. Some add other categories, such as Automobile or Vacation. Some spend more on food than others. The budget should fit the person.

Make a budget to show how you would use any money you might earn. Show your budget on a circle graph.

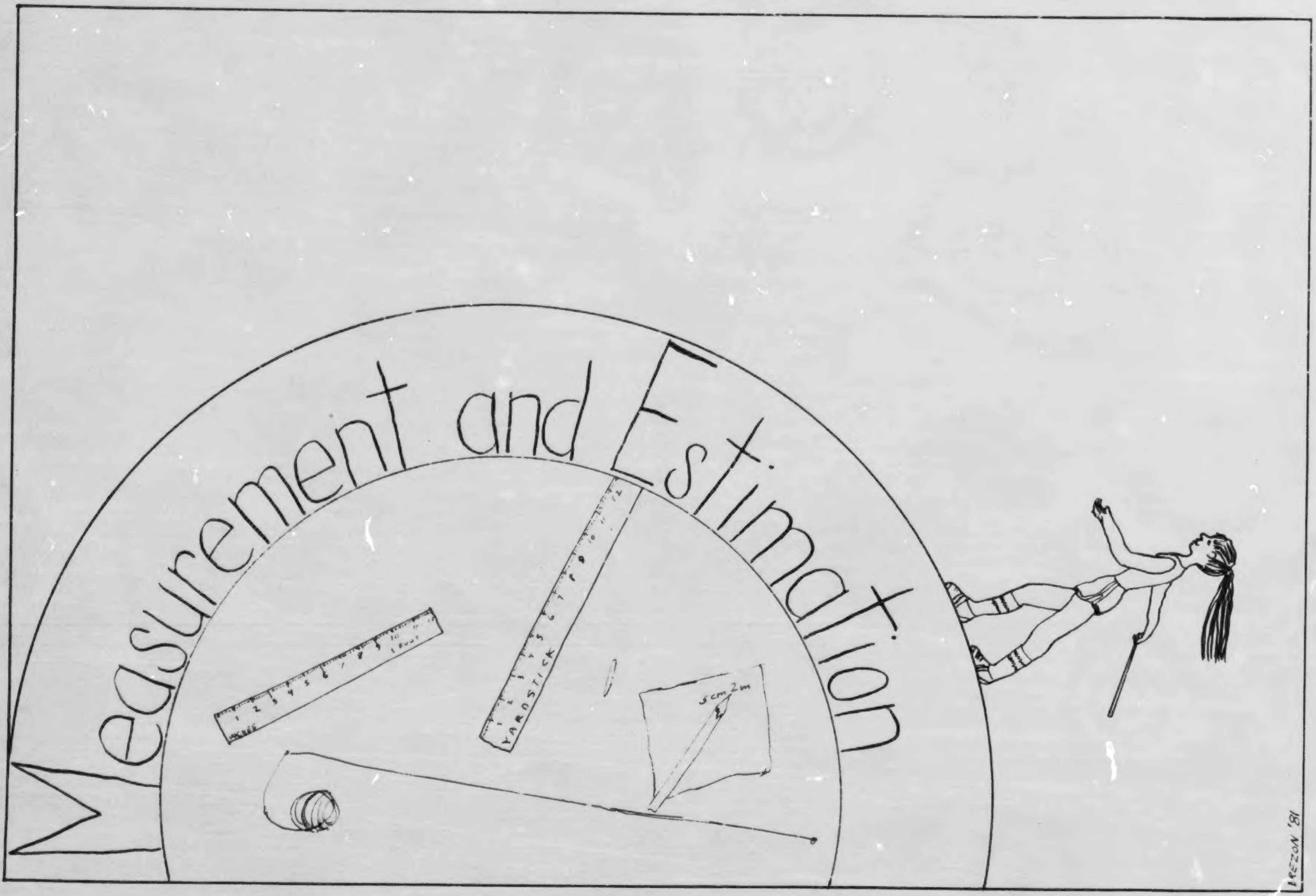
3. The Wilson family has an annual income of $34,000.00. Mrs. Wilson made a budget for the family.

They will spend:

25% for Clothing
30% for Entertainment
20% for Savings
15% for Food
10% for Gifts

Make a graph to show the Wilson's budget.

Measurement and Estimation


1 FOOT
YARDSTICK
5 cm 2m
BREZON '81

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to identify the smaller or larger object (limit: 2). K *K

ACTIVITIES

1. Have the children sort the pictures into piles, one for "things smaller than me" and another for "things larger than me."

   Materials: Pictures of a variety of objects some of which are smaller than a child and some of which are larger.

2. a. Place two similar boxes on a table. One box should be considerably larger than the other. Ask the children to tell which box is larger. Show that one box can fit inside the other.

   b. Provide the students with items such as spools of thread, marbles, toy blocks, and other objects which are familiar to them. Each item should be in two sizes. Have the students sort the objects placing the larger of each item into one box and the smaller into another box.

   Materials: Objects of two sizes such as spools of thread, marbles, blocks. Two boxes, one considerably larger than the other.

3. Use cut-outs of geometric shapes of different sizes. The teacher may begin by placing a model of a circle on the flannelboard. Direct the students to place a smaller one next to it. Continue in the same way using other shapes. Alternate the activity by directing the children to place a larger model next to the one shown.

   Materials: Construction paper, scissors.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to identify the objects that are the same or that are different. K *K

ACTIVITIES

1. Display a mixture of two sets of blocks, one large and one small. The shapes should vary, but the color should be the same, at least for the initial experiences. Have two children come forward and each choose a block. Have them compare the sizes and tell if they are about the same or different in size. If they are the same, hold up a block of contrasting size and help them decide whether they have big or little blocks and what size their blocks are. If the children have different sized blocks, have them decide which one is big and which one is little. Use these blocks to start two piles. Have the other children take turns sorting the remaining blocks into the piles according to size.

   Materials: Variety of blocks.

2. Draw or cut from magazines or workbooks pictures of different objects. For example, different baseball hats, footballs, flags, trees, cups, etc. For each set be sure to include two objects that are identical in addition to several distractors. Let the children find the pictures that are exactly alike.

   Materials: Posterboard, pictures from magazines or workbooks.

3. Make a folder game. On one side of a folder put two pictures that are the same and on the other side two pictures that are different and label each side "same" and "different." On about fifteen 5" x 7" cards have two pictures the same and on others have two pictures that are different. The child decides on which side the card goes. May put game on learning center.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to identify shorter or longer line segments (limit: 2). K-1 *1

ACTIVITIES

1. Hold up the ruler next to the baseball bat and ask which is longer and which is shorter. Ask the same about the ruler and the paper clip and other pairs of objects.

   Materials: Ruler, baseball bat, paper clip and other such objects.

2. Hang two pieces of colored yarn, or shoe laces, obviously different in length and color, on a hanger. Direct the children to observe and discuss the objects shown. Ask questions such as the following:

   How are these strings different? (One is long; one is short.)

   Is the blue string just as long as the red string?

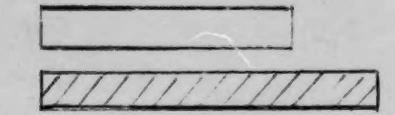
   What color is the longer string?

   Place strings horizontally on display board and repeat the activity above.

   In the same way, compare other pairs of objects whose difference in length is easily visible. For example: color rods, paint brushes, jumping ropes, soda straws, ribbons, pencils, crayons, and bead necklaces. Guide the children in placing the objects side by side to tell which is longer, which is shorter.

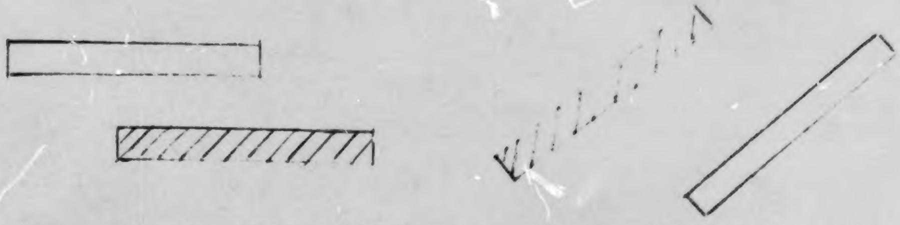
   Materials: Colored yarn or shoe laces, coat hanger.

3. Display two felt strips or construction paper strips of two different colors and of unequal length on the flannelboard. Align them at the left end.



   Ask the children which is longer. Have them notice that the objects are lined up at one end, and be sure they understand that the strip that "sticks out" on the other end is the longer of the two.

Move the strips about in different positions and ask which one is longer now.



If children seem unsure that the longer strip remains longer, regardless of position, align the strips again at one end to confirm this idea.

Have children help you compare other pairs of strips to find which one is longer. Encourage them to use the method of aligning the strips at one end to make the comparison.

Materials: Flannelboard, felt strips or construction paper.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to identify lighter or heavier objects (concrete). K-1 *1

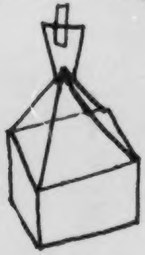
ACTIVITIES

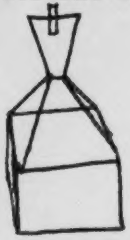
Weighing Common Objects

1a. Make two milk carton scales from half-gallon milk cartons. Punch a hole in the four sides and thread a piece of string through the holes. Tie the string at the top and attach it to a rubber band. Attach the rubber band on the end of the ruler and tape the ruler to the top of a desk or bookcase.

b. Provide approximately 20 common objects the students are familiar with - real objects (not plastic or substitute) objects which can be found in the home or school (shoe, orange, eraser, rock, crayons, etc.). Label each object by placing masking tape on the object and writing the word.

c. Have the students weigh the objects and tell which is heavier or lighter.





2a. Collect a group of common household objects with which the students are familiar. (Example: fruit, soap, can, shoe, etc.)

b. Construct a picture card to match each object.

c. Place a sheet of paper behind the scale for the picture cards to be placed on.

d. Have a student select three items to weigh on the milk carton scale. As each item is weighed, have the student place the matching picture card on the paper behind the scale on a line with the bottom of the milk carton. Have him record the three items in order from lightest to heaviest. Other children can check this by repeating the experiment and signing their names, indicating if they agree or disagree.

3a. Place several toys or blocks of different weights on a shelf.

b. Let the student arrange these objects from lightest to heaviest by just looking at them and guessing their weights.

c. Then have the student pick up the items one at a time and arrange them in order from lightest to heaviest.

d. Finally, have the student weigh the objects and determine how they should be arranged when their comparative weights are known.

Materials: Scales, objects to be weighed.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to relate concepts of before, after, between, morning, noon, afternoon, night, yesterday, tomorrow, now and later. K-2 *2

ACTIVITIES

1. Have the children draw, or cut out, pictures and paste them on cards, representing the main activities carried out each day in school. After these pictures have been posted in sequence, have the children develop a second set of pictures which show special events (holidays, birthdays, etc.) or activities that occur only once or twice each week. Occasionally, set aside time to use the cards in one of the following ways:

    a. Place one card on the board. Have the children find cards showing activities that occurred before the given event, and display them in sequence. Follow a similar procedure with cards depicting activities that occurred after the given event.

    b. Have the children arrange cards to show what happened yesterday (or today), and then arrange the set to show what will happen today (or tomorrow).

    Materials: Paper, magazines, glue, cards

2. Refer to the clock in daily activities so that the students can relate the passage of time with the clock.

    a. Illustrate the time the students come to kindergarten by showing this on a demonstration clock. Point out how this compares with various times during the day, such as snack time, story time, and time to go home.

    b. Use an egg timer to show how much time elapses in a minute....3 minutes.

    c. Have the student record the number of times he turns an egg timer over during a free play session. By turning the timer over several times he will begin to notice how long three minutes are.

3. In order for students to acquire and begin to use vocabulary related to time, it is important that you make it a point to comment on the activities and events that relate to time during the regular kindergarten day. For example, "After snack time we will hear a story." "Before you eat your snack you should wash your hands." "Put away the toys as it will soon be time to go home."

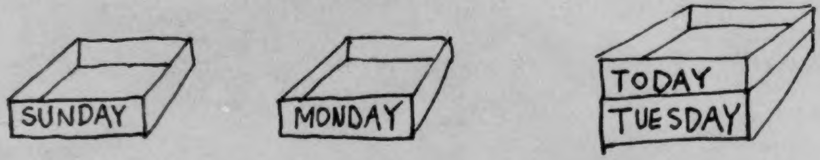
CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to name the days of the week and the months of the year.

K-2 *2

ACTIVITIES

1. Label seven boxes Sunday through Saturday and the eighth box "Today." Line up the first seven boxes and place the eighth box on the box showing the day of the week. Move the "Today" box at the beginning of each day. Ask the children what day it is, what day was yesterday, and what day tomorrow will be.



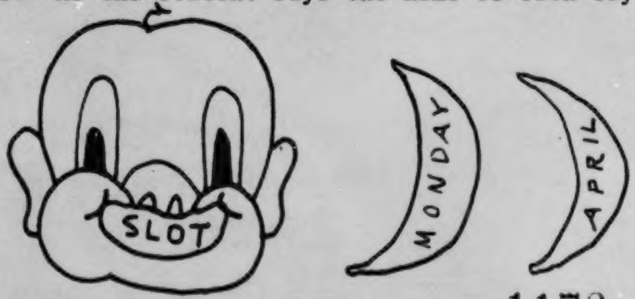
Materials: Eight boxes of the same size.

2. There are several songs and stories that the children may enjoy as they learn the names of the days of the week and practice saying them in order. In addition to old favorites such as the song, "This Is the Way We Wash Our Clothes," you might try the story, Tawny, Scrawny Lion by Kathryn Jackson (Racine, Wisconsin: Western Publishing Company, Inc., 1972); the poem, "Thirty Days Has September"; or "The Months" by Sara Coleridge, and the Polish folk song, "On a Monday Morning," Making Music Your Own, Book 2 (Morristown, New Jersey: Silver Burdett Company, 1971).

Materials: Story Tawny, Scrawny Lion by Kathryn Jackson, Poem "Thirty Days Has September," Song "On a Monday Morning."

3. Copy the pattern of the monkey on poster board and color. Make bananas from poster board and label with names of the days of the week and months of the year. As the student says the name of each day of week or month of the year, he gets to feed the monkey.

Materials: Poster board or tagboard, marks-a-lot.



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CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to sequence order of events. K-2

ACTIVITIES

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1. Discuss with students the order of events during the day. Ask questions such as, "What do you do when you get up in the morning?" "What do you do next, etc.?" Provide students with a blank book. At the top of the first page print morning, on the second page print noon, and on the last page print evening. Ask students to draw what they do at each time and take dictation from them at the bottom of each page.

2. Discuss with students the sequence of events that occur from the time they get up until they arrive at school. Prepare blank books entitled Getting Ready for School. Ask students to draw the sequence of events that occur prior to arriving at school.

3. Collect pictures from magazines that depict different events during the day. After a discussion with students, have students put the pictures in order.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will relate the concept of time to events (morning, noon, night). 1-2 *2

ACTIVITIES

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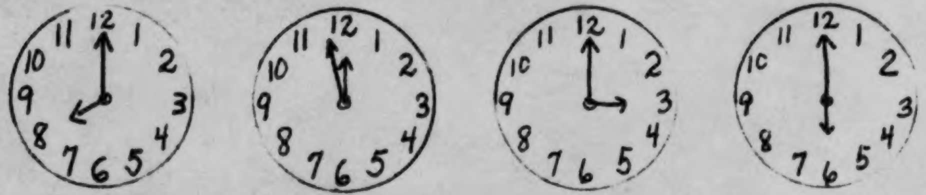
1. Prepare four work sheets with one of the clocks below on each sheet.



Ask students to look through magazines to find a picture of what they do at each time. They may choose to draw and write a sentence about their activity. Staple the sheets together to make a "Time Book."

2. Reverse the above activity. Have students cut and paste pictures that depict events during the day. Ask them to draw a clock with hands showing the approximate time this particular event occurs.

3. Make cards with times to the hour and half hour. Also make a clock with moveable hands. Have the children play "Telling Time." The first player picks a card from the deck. He or she then moves the hands of the clock to show the time that is shown on the card. A point is scored from each correct answer. Have the student tell something he/she thinks happens at that time of the day.

1173

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CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to:

(1) identify the hour and minute hands on the clock. 1-2 *2
(2) tell time on the hour. 1-2 *2
(3) tell time on the half hour. 1-3 *3

ACTIVITIES

---

1. Have the children work in pairs. One child writes a time and the other child sets the hands on the clock. Use a demonstration clock to review how many hands are on a clock and the purpose of each hand. Stress that the short hand points to the name of the hour and the long hand points to 12 when the hour has just begun. Explain that when the hour is half gone the long hand will point to 6.

2. Display two demonstration clocks on the chalk tray. Divide the children into two groups. Call out a time such as 2:00 o'clock. One child from each group sets the correct time. The child who shows the correct time first wins a point for his team. The team with the most points wins the game. Let the child who wins explain where the minute hand and hour hand should be.

3. Display a clock face with movable hands and 24 cards showing all possible times on the hours and half hours. The students may select partners and play a time game. One partner may shuffle the cards and place them face down. The partners may then take turns drawing a card and showing the correct time on the clock. For every correct answer the child wins a point. The child with the most points wins the game. As the children complete their turn, discuss with them the position of the minute hand and hour hand.

1175

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CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to use the calendar to determine the day of the week, the month and the year of a given date. 1-3 *3

ACTIVITIES

1. Display a calendar for the month. Give the children a blank calendar sheet. Have the children find what day the month begins and ends on. Then have the children fill in their calendar sheets. Ask questions about today's date, yesterday's date and tomorrow's date.

2. Give the children a calendar already filled in and the chart shown below. Supply cards with numerals 1-31 on them. Have the children place the correct number card by the correct day.

Example:

Sun.	Mon.	Tues.	Wed.	Thurs.	Fri.	Sat.
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Sunday	1	8	15	22	29
Monday	2	9	16	23	30
Tuesday	3	10	17	24	31
Wednesday	4	11	18	25	
Thursday	5	12	19	26	
Friday	6	13	20	27	
Saturday	7	14	21	28	

3. Display a large calendar chart. Have the children place the days of the week on the chart. After discussing with the children the day the month begins and ends, have the children take turns placing the numbers on the chart in their proper places.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to record time (limit to hour and half-hour; using colon notation, e.g., 12:30). 2-3 *3

ACTIVITIES

1. Using a demonstration clock show a time on the hour and half-hour. Have students record the time on paper. Divide the students into small groups of three or four. Give one student a paper plate clock. As that student shows the time on the clock have other students record the time.

2. Have students write down the various activities that they do during the school day. Beside each activity have them draw a clock and write the time beside the clock.

3. Make a worksheet with clock faces on it. Have the demonstration clock with the numbers 5, 10, 15, 20, etc., around the outer face available for the students to use. Ask students to record the time under the clocks on the worksheet.

1181 1182

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to record time using colon notation (designate A.M. or P.M.). 4-8

ACTIVITIES

---

1. Using a clock face show 15 minutes after 9. Then say to the students, "We can show this in another way." Write 9:15 A.M. Then show 8 minutes after 10. Write 10:08 A.M. Give several examples for students to do using the clock face.

2. Have students write the following times using colon notation, A.M. and P.M.

   a. 4 minutes after 8
   b. Twelve fifteen
   c. 35 minutes after 1
   d. 20 minutes after 4
   e. 15 minutes before 10

3. Have one child come and fix the clock face to show the time he wants. That student then calls on another student to come and write the time using colon notation.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to tell time on the quarter hour. 2-4

ACTIVITIES

1. Use a demonstration clock. Tell the children that they can count by fives to find how many minutes are in an hour because each number on the clock also represents 5 minutes. Have them count aloud. Write the numerals 5, 10, 15 and go around the outer ring of the clock. Demonstrate 9:00 on the clock. Then move the hand to 3. Write 9:15 on the board. Follow a similar procedure to discuss 9:30, 9:45, and 10:00. Continue this activity until students can correctly record time to the quarter hour. Have students color or shade in a clock in fourths. Each color represents 15 minutes.

2. Have the children make a time book. On each page have them show a clock with a different time and draw a picture to show what they usually do at that time. Include time to the quarter hour.

3. Have children make paper clocks. Give each child a paper plate, a fastener, and two cardboard strips for the hands. Show children how to place the 12, 3, 6 and 9 on the clock first. Demonstrate how to put the hand on the clock. Call out the time and have students show the time on their clock.

1185 1186

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to tell time to the nearest five-minute interval. 2-5 *5

ACTIVITIES

1. Display a large clockface with hands pointing on the hour, as 1:00. Then move to five minutes past the hour as the students count the minutes. Guide the students to tell that there are five minutes between each numeral on the clockface. Have the students count by 5's to 60 as the minute hand swings around the clockface.

2. Have students show the following times using a clockface.

   a. Five minutes to 11:00
   b. Five minutes after 2:00
   c. Five minutes to 10:00
   d. Five minutes to 6:00

3. Use activity 1 for Special Needs.

1188

1187

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to tell time to the nearest minute. 3-6 *6

ACTIVITIES

1. Give students clock faces like the following. Have students draw hands to show the correct time. Clocks should be larger to show minutes.

3:03

1:56

2:47

7:37

8:16

7:36

12:15

4:08

8:11

10:22

9:36

11:52

1:41

9:08

4:13

2. Provide students with clock faces. Have them show times such as the following:

a. 11 minutes after 8 b. 7 minutes after 11 c. 33 minutes after 9

3. Using a large clock face point to each space between marks. Explain that each space between marks shows 1 minute for the minute hand. There are 60 minutes in an hour. Use the clock face and show the following times.

a. 12 minutes after 8 b. 14 minutes after 4 c. 22 minutes after 5

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to compute sums and differences in time problems involving hours and minutes. 5-8 *8

ACTIVITIES

1. Give the students the daily class schedule in your classroom. Have them compute the length of time allotted for each subject, how much time is spent outside the classroom, the total amount of instruction time and the total amount spent at school each day.

2. Let the students collect schedules from airlines on flight times (departure and arrival). Have them compute actual time used for each flight. Remind them to take time zone changes into consideration in the computation.

3. Make a set of cards on which the times shown on the cards may be matched.

   Examples: 60 minutes = 1 hour

   75 minutes = 1 hour, 15 minutes

   125 minutes = 2 hours, 5 minutes

   180 minutes = 3 hours

   Let the students work in pairs to match the correct times. Supply an answer key for self-checking.

1191

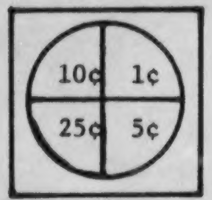
1192

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to identify cent, nickel, dime and quarter. K *K

ACTIVITIES

1a. Make a copy of the spinner illustrated:



b. Let a child spin the spinner. If it lands on 5¢, the children reach into their bags and attempt to remove the nickel, using only their sense of touch.

Materials: A penny, nickel, dime, and quarter in a bag for each child and a spinner.

2. Provide each of several children with several different coins. Play the game of "Show Me" by giving them directions similar to these:

   a. Show me a coin worth 1 cent.
   b. Show me a coin you could use to buy a pencil.
   c. Show me a coin worth 5 cents.
   d. Show me a coin you would use to buy 10 pieces of one-cent bubble gum.
   e. Show me a quarter.

   Materials: Penny, nickel, dime, quarter

3. Display each of the coins, one at a time, and let the children describe it in detail. Give the class time to examine the coins closely. Lay an open box of mixed coins on a table and have the children one at a time pick out a specific coin. Once they have mastered this, let the children pick out more than one coin.

   Materials: Box, dimes, nickels, pennies, quarters

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to recognize the value of 1-10 pennies. K

ACTIVITIES

1. Let the students play banker. Give one child a large collection of pennies. Have the other students go to the banker and ask to be given from 1¢ to 10¢. The "banker" counts out the pennies and the children check the correctness of the amount.

   Materials: Pennies

2. Play store by placing small objects on a table. Each object should have a tag stating its money value. For example, you may wish to have a:

   1¢ tag on each hard candy
   2¢ tag on each lollipop
   3¢ tag on each string of beads
   4¢ tag on each pencil
   5¢ tag on each box of crayons

   Provide each child with toy pennies. Have volunteers take turns as storekeepers and customers. Question the children as they play store:

   How many pennies do you need to buy a pencil? to buy a box of crayons? If you have one penny can you buy a lollipop? Why not? What things could you buy with five pennies?

   Materials: Small objects, pricing labels

3. Draw the diagram illustrated below on a large piece of paper.

1¢	2¢	3¢	4¢	5¢
6¢	7¢	8¢	9¢	10

   Have the students bring in items that cost different prices from 1¢ - 10¢ to pin on the paper. Each item is pinned up in the appropriate section on the board according to its price.

   Materials: Large piece of paper, pricing labels, small items brought from home

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to:
(1) identify the ¢ symbol. 2 *2
(2) associate the ¢ symbol with the value of cent, nickel, dime, and quarter. 2 *2
(3) recognize the monetary value of cent, nickel, dime, and quarter. 1-3 *3

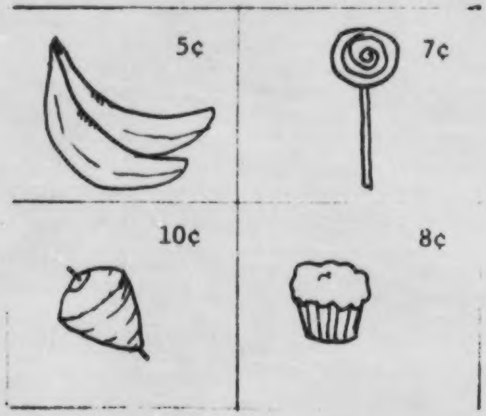
ACTIVITIES

1. Provide the children with some paper coins. Obtain some blank commercial price tags, or make some out of tagboard. Label each tag with a price less than 50 cents and put them in a container. Have the children work in small groups, taking one price tag at a time from the container. They are to use their coins and count out the amounts shown on the tags.

2. Show the amount in as many ways as you can. Write P for penny, N for nickel, D for dime.
Example: 11¢: 11 P, 1 P, 2 N, and 1 N and 6 P.

   12¢
   16¢
   10¢

3. Have the children start activities in the play store. Give the children a worksheet similar to the one below and some punchout coins. Have the children select an item and place the correct amount of money (coins) under each item.



1197

1198

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to write the value of money using the dollar sign and decimal point. 2-4 *4

ACTIVITIES

---

1. Explain to the students that 100 cents have the same value as 1 dollar. Another way to write 100 cents is $1.00. An amount less than 100 cents can be written this way: $0.50. It means "no dollars and 50 cents."

2. Have the students write the values for the following amounts of money using the dollar and cents notation.

   Example:

   (1) 1 dollar and 1 dime
   (2) 3 dollars and 2 dimes
   (3) 2 dollars and 1 nickel
   (4) 5 dollars and 3 dimes
   (5) 2 quarters and 3 pennies

3. Have students write the value of each amount of money using the dollar and cents notation.

   (1) 83 cents
   (2) 99 cents
   (3) 1 dollar and 10 cents
   (4) 2 dollars
   (5) 3 dollars and 3 cents
   (6) 10 dollars and 1 cent

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to:
(1) count change to $1.00. 3-4 *4
(2) count change to $5.00. 4-8

ACTIVITIES

1. Make cards with pictures of items for sale. Use play money of several denominations (not to exceed a dollar bill). Let some students act as clerks. Put price tags on cards. Give some children a quarter, and ask them to choose something they can buy for less than a quarter. Direct the clerks to make change for a quarter by counting 20 pennies. Then ask what other coin they must give the buyer to make 25 cents. Let other students take turns as clerk and buyer.

2. Have students solve problems using a table. Use play money if needed.
Example:

Choose 2 coins to show the change

	COST	PAID	CHANGE			
			dollar	half-dollar	quarter	dime
(1)	$2.65	$3.00			X	X
(2)	1.65	2.00			X	X
(3)	3.75	5.00	X		X	
(4)	.65	1.00			X	X
(5)	1.25	2.00		X	X	

3. Have students complete a table similar to the following:

CHANGE	COST	GAVE CLERK
1 dime, 1 nickel	10¢	______
1 quarter, 2 nickels	15¢	______
2 quarters, 4 pennies	46¢	______
2 dimes, 2 nickels	25¢	______

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to add and subtract dollars and cents. 3-6

ACTIVITIES

1. Have the students cut pictures of various items from catalogs or newspapers and give them index cards. Attach a price tag to each. For practice in addition, have the students determine the cost for some of the items. For practice in subtraction, allow them a certain amount of money, e.g., $25.00, and have them determine the amount of change they would receive from the transaction if they purchased several of the items.

2. Have the children cut advertisements from the newspaper using dollars and cents to make up several picture problems, with three things in each. Pairs of children may exchange problems to find the total cost in each.

3. Have the children play Tic-Tac-Toe by writing the answer using dollars and cents notation.
Example:

3 dollars +2 quarters $3.50	50 cents +90 cents	1 dollar 2 dimes +4 quarters
2 dollars +4 quarters	3 dollars -9 dimes	5 dimes +4 nickels
10 pennies +10 nickels	3 quarters -4 dimes	80 cents +40 cents

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to multiply and divide money. 6-8

ACTIVITIES

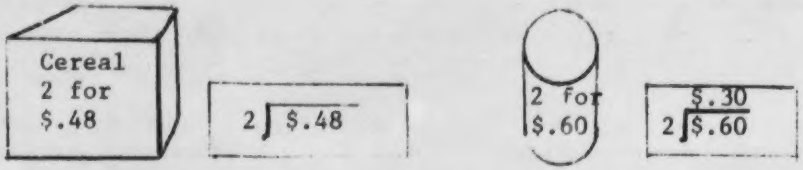
1. Put some multiplication and division exercises like these on the board:

$$\begin{array}{l} 423 \text{ pennies} \\ \underline{\text{x}2} \\ 846 \text{ pennies} \end{array} \qquad \begin{array}{l} 212 \text{ pennies} \\ \underline{\text{x}4} \\ 848 \text{ pennies} \end{array} \qquad \begin{array}{rl} 132 & \text{pennies} \\ 3\overline{)396} & \text{pennies} \end{array} \qquad \begin{array}{rl} 212 & \text{pennies} \\ 4\overline{)848} & \text{pennies} \end{array}$$

Have volunteers work the problems to see how many pennies or cents there are. Then ask students to think of another way to write 846 cents, 848 cents, 132 cents, and 212 cents. Have someone redo these problems using dollar and cent notations. Explain that we multiply amounts of money just like we multiply whole numbers. We just have to remember to write the dollar sign and decimal in the answer.

2. Have students find prices of items in newspapers or catalogs. Put each item and price on a card. Then put all the cards in a container. Students draw a card, and roll a die (1-6) to see how many of the items were purchased. Students then multiply to find the total cost.

3. Bring empty grocery containers to class. Label the products: 2 for $.48, 3 for $.90, 2 for $1.00, etc. Have cards computing the unit cost. Students are to match the cards to the appropriate grocery item, observing how to divide and write the amounts:



Correct responses may be taped to the bottom of each item for self-checking.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to compute answers to problems involving money. 6-8 *8

ACTIVITIES

1. Have the students solve problems such as the following:

   A. Find the cost of 4½ pounds of lobster and 1¼ pounds of oysters. ($45.83)

Product	Cost per Pound
Crawfish	$1.89
Shrimp	3.69
Oyster	4.80
Lobster	8.85

   B. Find the cost of 2½ pounds shrimp and 6-3/4 pounds of crawfish. ($21.99)

   C. Find the cost of 2½ pounds of each. ($48.09)

2. Have students make up a party menu and a guest list. Then have students determine how much of each item should be purchased. They can use newspaper advertisements and circulars to help find the total cost of the party.

3. Using newspaper advertisements, have students find prices for quantities of items, e.g., 6 for 89¢, 3 for $1.00, and attach each to a separate card. Number the cards. On half the cards write how many you buy and put in a box labeled, "What will they cost?" Write how much you spend on the other cards and put in a box labeled, "How many will you get?" Students find the answers and use an answer key to check.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to:

(1) identify the inch and the foot as units of customary linear measure. 1-2 *2

(2) measure using the inch and foot on a ruler. 1-3

ACTIVITIES

1. Provide a table with a variety of objects on it for children to measure. You may want to have the children keep a record of the lengths of the various items. Measurement can be in centimeters, inches or feet. Suggest that children compare their answers.

2. Mark off enough inches on a paper strip to measure the children's heights. Attach the strip to the wall so that 0 is at floor level. Demonstrate how to measure someone's height by placing a ruler or similar object on their head even with a number on the strip. Then have the children work in pairs to measure each other's height. Suggest they record their heights in centimeters next to their names on a chart. Children can also measure their hands, fingers, and feet.

3. The students can choose partners and work together. One student can measure all the objects with an "inch" ruler, recording his measurements. The other student can measure the objects with a centimeter ruler and record his measurements. When the measurements are completed, the students can compare the measurements and discuss the results.

1210

1209

CONTENT: Measurement and Estimation

OBJECTIVE: The student will identify the centimeter and the meter as units of metric linear measurement. 1-3 *3

ACTIVITIES

1. Provide students with a metric ruler (or some object 1 m long, such as a piece of string). Students demonstrate with their hands the length of a meter. Using their metric ruler the student will:

   a. look for several objects in the classroom that are approximately 1 m in length.

   b. name six things in the classroom that are longer than one meter.

   c. tell how many meters long the classroom is.

   Provide students with centimeter ruler. Have them measure things in the classroom to the nearest centimeter. Then have them make a measurement booklet by cutting and pasting pictures from magazines. They will then measure each object to the nearest centimeter and record the results.

2. Prepare worksheets similar to the following. Let students estimate and then check their estimates.

How many meters?	Estimated	Actual
1. Your desk?		
2. Your friend?		
3. The doorway?		
4. Your bicycle?		
5. The water fountain?		

How many centimeters?	Estimated	Actual
1. A piece of chalk?		
2. Your index finger?		
3. Your shoe?		
4. Your pencil?		
5. Your math book?		

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to:
1. Measure length to the nearest inch. 1-3 *3
2. Measure length to the nearest half-inch, inch, foot, and yard. 3-4 *4
3. Measure a length to the nearest one-fourth and/or one-eighth inch. 4-7 *7

ACTIVITIES

(Use the same ideas presented for Metric Measure)

1. Have students measure the length of several books in the classroom using arbitrary units. Ask if all the books are the same length. Explain that measurement is an approximate phenomenon. The degree of accuracy depends on the purpose for which the measurement is taken. Provide rulers marked to 1/4 inch and a collection of objects such as nails, combs, hairpins, cuisenaire rods. Have the student use the rulers to measure and record the length of each. Call attention to the fact that all of the objects were not exactly 1 inch or 2 inches long. Ask them questions such as: Is the length of the hairpen nearer to 2 inches or 3 inches? Illustrate with examples on chalkboard.

2. Give the students a list of things to measure in the classroom and record the information. Have students compare their measurements. Discuss any variations.

3. Let the students use arbitrary units first to measure things in the classroom. Discuss their findings such as: the book is 10 paper clips long, the desk is 5 erasers long. Then let the students use the ruler to measure some of the same objects. (If the ruler has not been introduced as a unit of measure, do so before asking students to use the ruler to measure.)

1213 1214

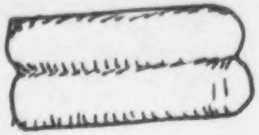
CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to measure lengths using centimeters. 1-3 *3

ACTIVITIES

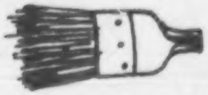
1. Organize a metric measure hunt with the children. Supply each child with strips of paper measuring 3 cm, 4 cm, 5 cm, 7 cm, 9 cm, 11 cm, 12 cm, and 15 cm. Let the children find something in the room the size of each strip.

2. Give the students several incomplete drawings. Have the students use their centimeter ruler to complete each drawing as directed.

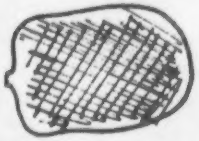


Draw a stick on the popcicle.
Make it 5 cm long.

Draw a handle on the paintbrush. Make it 4 cm long.



Draw a handle on the flyswatter. Make it 7 cm long.



3. Let the students measure parts of their bodies. Include such things as length of their foot, leg, arm, width of smile, hand, distance around waist, chest, thigh. Then let them draw a self-portrait and label the parts of the body with the measurements. These may be used on a bulletin board and prizes (ribbons) attached to show such things as widest smile, biggest and smallest foot, etc.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to measure lengths using the meter. 2-4 *4

ACTIVITIES

1. Supply each child with a meter stick. Ask them to locate and record five things that are one meter long and five things that are two meters long.

2. Put the students in groups of five. Supply each group with fishing string and a meter stick. Have four children stand at various places on the playground. Let the fifth child measure the distance between each with fishing line. The group will then measure the total distance of the fishing line with the meter stick.

3. Give the children a chart such as the following. Have them mark each item in the correct box.

IS IT MORE THAN ONE METER?

1. Your room?
2. The doorway?
3. Your shoes?
4. The principal?
5. The water fountain?
6. The teacher's desk?

MORE	LESS

IS IT LESS THAN TWO METERS?

1. Your friend?
2. The bulletin board?
3. The chalkboard?
4. Your dad's car?
5. Our classroom?
6. Your bicycle?
7. Your house?
8. A big tree?
9. Your leg?
10. The street?

MORE	LESS

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to measure lengths in inches, feet and yards. 2-6

ACTIVITIES

1. Give examples of measurements of line segments students are to measure and record the length to the nearest inch, foot, and yard.

   Example: ______________________________

   Find and record the length of the line segment above as indicated.

inch	1/2-inch	1/4-inch	1/8-inch

2. Cut numbered oak tag into different lengths. Have students take turns measuring. Students may suggest other objects in the classroom to be measured. Make a numbered answer sheet for self-checking.

3. Have students measure and record the following.

   a. your smile
   b. your arm
   c. your foot
   d. your waist
   e. your height

inches	feet	yards

1219

1220

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to measure:

1. lengths to the nearest millimeter. 5-8
2. capacity in liters and milliliters. 5-8

ACTIVITIES

1. Provide the students with centimeter rulers that include millimeter markings. Count the number of millimeter divisions in 1 centimeter (cm.). Emphasize that 10 millimeters are equivalent to 1 cm. Draw a line segment for each of the following lengths.

a. 88 mm.	c. 100 mm.	e. 16 mm.
b. 67 mm.	d. 150 mm.	f. 61 mm.

2. Display a number of containers such as a cup, soda bottle, and a pail. Have students guess and then find how much water each container will hold, giving their answers in liters or milliliters.

   Write (ml) or (l) to describe the units:

   a. amount of liquid to fill an eye dropper (ml)

   b. amount of liquid to fill a coconut (l)

   c. water in the sink (l)

3. Which is heavier: 25 l of water or 35,000 ml of water? (35,000 ml)

4. Write the words "liter" and "milliliter" on the chalkboard. Use a liter container marked off in milliliters to show 1,000 ml = 1 l.

   Have students display on bulletin board pictures of these things which can be described with this unit of measure.

   Example: Carton of milk, bottle of ink, pitcher of punch

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to determine the appropriate unit to measure length in the metric and customary systems. 4-9 *9

ACTIVITIES

1. After introducing the units of linear measure, bring in a large trash bag of objects and/or pictures of things to be measured. Have students make a table-top display, classifying the objects into appropriate categories of measurement. The following are suggested categories and objects for display:

    a. Millimeter or fractions of an inch. Since these are used to measure very small things and to measure very precisely, you may have to think in terms of measuring width or thickness of these objects--paper clip, eraser, crayon, nails, dime, quarter, key, capsule, needle, toothpick, yarn, ring, etc.

    b. Centimeters or inches--toothbrush, nail file, book, tablet, spoon, ribbon, chalk, pen, stapler, plaque, etc.

    c. Meters or yards/feet--baseball bat, umbrella, fishing rod, pictures of rooms, swimming pool, fence, etc.

    d. Kilometers and miles--maps or cards stating distances from one location to another.

2. Have students estimate and then measure the objects in the different categories suggested in activity 1.

3. Have students bring objects from home to add to the table top display suggested in activity 1.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will measure weight in pounds. 3 *3

ACTIVITIES

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1. Ask the students to bring different types of scales to class. Carefully prepare 1, 2, 4, and 8 pound bags of sand. Have groups of students place each of the bags of sand on the scales and observe what happens to the needle. Then have them use the bags of sand to illustrate various weights such as 3 pounds, 5 pounds, and 13 pounds.

2. Provide objects such as books, flower pots, trash cans, etc., for students to estimate weight. Provide scales for them to compare the difference between estimated and actual weight.

3. Obtain school scale and let children weigh themselves at different intervals during the year and record their weight. Provide each a chart similar to the following:

NAME ____________________________

DATE ____	ESTIMATED WEIGHT	WEIGHT
________	________	________
________	________	________
________	________	________

1225

1226

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to measure weight in pounds and ounces. 2-4 *4

---

1. Ask the student to look for different kinds of scales at home and in stores. Cut out pictures from magazines and display them.

   Ask students to guess the weight of some common objects such as a pencil sharpener, coat, telephone, water glass, etc. Then use the scales to find the actual weight.

2. Have students select a group of about 10 objects to be weighed. First, have them express each object's weight in pounds and ounces and then in ounces. Working as a group, let them design a chart showing the results of the project.

3. Have the students circle all the items in a newspaper advertisement that are sold by the ounce. Ask them to use a different color to circle those items which are sold by the pound.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to weigh in grams and kilograms. 3-5 *5

ACTIVITIES

1. Provide one scale for weighing in grams, one for measuring in kilograms. Show the students how to use the scales and to read the weights. Have the students weigh some objects. Explain: A weight unit in the metric system is the kilogram and gram. Weight in the customary system is the pound.

2. Using a table of measures have students complete the following:

   (1) How many grams are in 4 kilograms?

   1 kg. = 1,000 g
   4 kg. = 1,000 g + 1,000 g + 1,000 g + 1,000 g
   = 4,000 g

   (2) How many kilograms are in 2,000 grams?

   1,000 g = 1 kg.

   2,000 g = 2 kg.

   a. 6,000 g = ________ kg. b. 10,000 g = ________ kg.

3. Have students make balls of clay that weigh approximately: (Do not measure)

   (1) 1 g
   (2) 100 g
   (3) 10 g

   Then weigh each ball to determine the actual weight.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to determine the appropriate unit to measure weight (mass) in metric and customary system. 5-9 *9

ACTIVITIES

1. a. On one side of a balance scale place a gram weight and a kilogram weight. Students can take turns placing objects on the other side to determine whether each object is greater or less than a kilogram. Point out that objects less than a kilogram are weighed with grams.

   b. Do the same activity using a pound weight. Point out that objects less than a pound are weighed with ounces.

2. Put 10 items on a table. Have students estimate the weight of each and list them in order from lightest to heaviest. Beside each word on the list, label whether it would be weighed with ounces or pounds. Then label those that would be weighed with grams or kilograms. After all have completed the activity, weigh the objects on appropriate scales to see who was correct.

3. Have students collect five objects that they think are less than a kilogram or pound and five that they think are more than a kilogram or pound. Use the balance scale to check their estimates.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to read a thermometer (Celsius and Fahrenheit). 3-6 *6

ACTIVITIES

---

1. Discuss with students the uses of the thermometer in the home, in the school, and elsewhere in the community and the ways in which its use affects our daily lives. Call attention to the structure of the thermometer, the scale, the length of the column of mercury and the unit of measure used. Have the pupils read the numbers actually appearing on the scale, including zero (0) and the tens shown at intervals above zero from 0 to 100 in order and in random order. Repeat from 0 to 40 below 0. Readings below 0 are expressed in minus quantities such as -10° Celsius.

2. Using the Celsius and Fahrenheit thermometers made by the teacher, have students show the following:

   (1) The temperature was 13°. It rose 27°. What is the new temperature?
   (2) Was 20°. Fell 14°. Find the new temperature.
   (3) Was 12° below zero. Rose 32°.

3. Make two large thermometers. Mark one in degrees Celsius and the other in degrees Fahrenheit. Have students estimate the temperature of:
   (1) the room
   (2) a pail of ice water

   Show the student what will happen to the thermometer when the temperature rises and falls. Using two actual thermometers determine the temperature of:
   ... the room
   ... the pail of ice water

1234

1233

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to recognize the cup, pint, and the quart as units of customary liquid measure. (Use the same activities for liter.) 1-3 *3

ACTIVITIES

1. The student may experiment by filling various containers with sand or water. When they have completed their experiments, each one should be able to determine how many cups of sand it takes to fill a one pint container and also how many cups of sand it will take to fill a quart container. If various shaped containers are available, have the students experiment to discover that two containers may have a different shape but the capacity may be the same.

2. Use food coloring for varying amounts of colored water. The child can mix premeasured amounts of water to make different colors. For example: a pint of yellow and a pint of blue water makes 1 quart of green water. A liter of red water and a liter of blue water makes two liters of purple water.

3. Let the child experiment with pouring. Elicit that certain familiar containers hold more, less, or about 1 quart or 1 pint.

1236

1235

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to measure liquid to nearest cup, pint, quart, half-gallon, and gallon. 2-3 *3

ACTIVITIES

---

1. Collect several liquid containers such as jugs, cans, pails, and a funnel. You will also need these liquid measures: gallon, half-gallon, quart, pint, and cup. Ask your children to arrange these in order of size, starting with the smallest. Direct the children to first estimate each capacity, then measure it, and finally record their measurement.

2. Encourage the children to experiment and find out about the capacity of such familiar containers as soft drink bottles and milk cartons. Elicit comparisons between the different containers.

3. Provide the children with measuring containers filled with water, sand, dried beans, beads or corn meal. Allow the children to experiment with the different measuring containers to determine how much each container of water, etc., holds. Ask them to record their findings.

1238

1237

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to make conversion of cups to pints, pints to quarts, and quarts to gallons. 2-4

ACTIVITIES

1. Get a measuring cup, a pint container, a quart container, a half-gallon and gallon container. Label each container. Have students measure to find answers to these questions. Use water to find answers to these questions.

   a. How many cups in a pint?
   b. How many pints in a quart?
   c. How many quarts in a half-gallon?
   d. How many half-gallons in a gallon?

2. Have students complete similar activities. Example:

   a. 6 cups will fill _____ quarts and _____ pints
   b. 4 cups will fill _____ pints
   c. 3 quarts will fill _____ gallons and _____ pints
   d. 5 cups will fill _____ pints and _____ cups
   e. 4 cups will fill _____ quarts

3. Have students complete the following exercise. Provide the chart below for assistance.

	Cups	Pints
(1)	2	?
(2)	4	?
(3)	6	?

	Cups	Quarts
(4)	4	1
(5)	8	?
(6)	?	4

	Quarts	Gallons
(7)	4	?
(8)	8	?
(9)	?	3

CONVERSION CHART

<table>
<tr><td>C</td><td>C</td><td>C</td><td>C</td><td>C</td><td>C</td><td>C</td><td>C</td><td>C</td><td>C</td><td>C</td><td>C</td><td>C</td><td>C</td><td>C</td><td>C</td></tr>
<tr><td colspan="2">PT.</td><td colspan="2">PT.</td><td colspan="2">PT.</td><td colspan="2">PT.</td><td colspan="2">PT.</td><td colspan="2">PT.</td><td colspan="2">PT.</td><td colspan="2">PT.</td></tr>
<tr><td colspan="4">QT.</td><td colspan="4">QT.</td><td colspan="4">QT.</td><td colspan="4">QT.</td></tr>
<tr><td colspan="8">½ GAL.</td><td colspan="8">½ GAL.</td></tr>
<tr><td colspan="16">GALLON</td></tr>
</table>

1239

1240

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to measure volume in liters, half liters and quarter liters. 2-4 *4

ACTIVITIES

---

1. Have a student follow these directions:

   (1) Fill a one-liter container with water.
   (2) Empty the liter container into two half-liter containers.
   (3) Empty each of the two half-liter containers into two quarter-liter containers.

2. Have the students play Tic-Tac-Toe using a grid. Have them tell which is greater before making their X or O.

   Example:

1 liter or 3 half liters	2 quarter liters or 2 liters	5 half liters or 3 liters
9 quarter liters or 3 liters	3 half liters or 4 quarter liters	3 liters or 3 half liters
10 half liters or 3 liters	5 liters or 5 quarter liters	1 liter or 3 quarter liters

3. Children should be encouraged to experiment and find out about the capacity of such familiar containers as soft drink bottles and milk cartons. Encourage them to make comparisons such as, "This soft drink bottle holds about as much as that milk bottle."

1242

1241

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to make conversions of one-fourth liter and one-half liter to liter. 3-5

ACTIVITIES

1. Provide students with a quarter-liter container and a liter container. Have students count the number of quarter-liters of water needed to fill the liter container. Ask them to write the mathematical equation to show the operation, e.g., _______ quarter-liters = _______ liter.

2. Have student use a quarter-liter and a half-liter container to fill a liter container. Ask them to answer the following questions:

   How many half-liters are there in a liter? _______
   How many quarter-liters in a liter? ______

3. Have the students play Tic-Tac-Toe using a grid. Have them tell which is greater before making their "X" or "O."

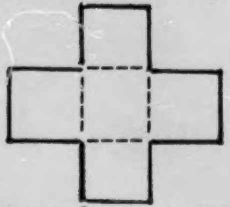
1 liter or 3 half-liters	2 quarter-liters of 2 liters	5 half-liters or 3 liters
9 quarter-liters or 3 liters	3 half-liters or 4 quarter-liters	3 liters or 3 half-liters
10 half-liters or 3 liters	5 liters or 5 quarter-liters	1 liter or 3 quarter-liters

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to determine the appropriate unit to measure liquids in the metric and customary systems. 4-9 *9

---

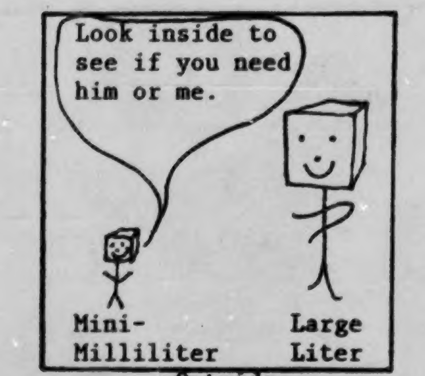
1. a. To emphasize the idea that a milliliter is a unit of measure for a very small quantity and liters are for larger quantities, have students construct milliliter and liter cubes. To construct the cubes, cut a pattern like the following from plastic-coated milk cartons:



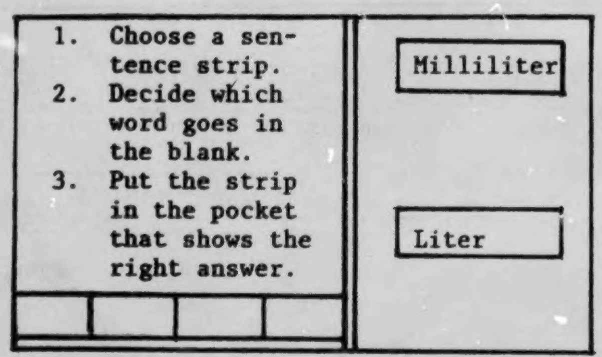
For milliliter cubes, cut a pattern 1 cm. on each side; for liter cubes, 10 cm. in each side. Tape the cubes together tightly with heavy duty tape so they can be used to measure liquids. Suggest that amounts below one liter should be measured by milliliters and above a liter should be measured by liters.

   b. Display half-pint (cup), pint, quart, and gallon milk containers. Have students locate products and things measured by each, write the product on a piece of paper, and place it in the appropriate container.

2. a. To provide independent work on the metric system, make a folder like the following:


Look inside to see if you need him or me.
Mini-Milliliter
Large Liter

Outside


1. Choose a sentence strip.
2. Decide which word goes in the blank.
3. Put the strip in the pocket that shows the right answer.
Milliliter
Liter

Inside

Sample statements are:

1. Please give me 2 _____ of gas.
2. Our pool holds 5,000 _____ of water.
3. The motorcycle's gas tank held 5 _____ of gas.
4. I have 300 _____ of soft drink in my bottle.
5. Jim drinks 1 _____ of milk each day.

b. To follow-up on work with the customary units of measure, have students make a bar graph illustrating products or things measured by cups, pints, quarts, and gallons.

3. a. Bring in different kinds of liquid containers: soft drink bottles, baby bottles, juice cans, coffee cups, etc. Pour water from each container into a 1000 ml. graduated cylinder to see which container is less than a liter and which is more than a liter.

b. Using the same liquid containers, pour water from each container into the cup, pint, quart, and gallon containers to see which unit would be appropriate for the amount.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to recognize abbreviations and equivalents in the customary system and measure familiar items. 5-8

ACTIVITIES

Introduce units of measurement (U.S. Customary Unit) to students:

Length

1 foot (ft.) = 12 inches (in.)

1 yard (yd.) = 3 feet

1 mile (mi.) = 5,280 feet

1 mile (mi.) = 1,760 yards

Weight

1 pound (lb.) = 16 ounces (oz.)

1 ton = 2,000 pounds

Capacity

1 pint (pt.) = 2 cups

1 quart (qt.) = 2 pints

1 gallon (gal.) = 4 quarts

Temperature

Water freezes at 32°F

Water boils at 212°F

1249

1250

A. Have students construct paper yardsticks marked off in inches. Have students measure themselves. The students may first guess, then measure. This information may be recorded.

B. Make available measuring tools for weight and capacity. Allow students to experiment with measuring tools, weighing familiar objects and measuring amounts of liquid.

C. Provide groups of students with thermometers. Let the students experiment with different temperatures, such as the temperature in the room, outside, in the school refrigerator and in a glass of ice water.

D. Write ft., yd., mi., pt., qt., or °F to name the unit described.

1. A little longer than a man's foot. (ft.)
2. About the size of a marshmallow. (oz.)
3. A little longer than your arm. (yd.)
4. Thirty-two of them tell us when water freezes. (°F)
5. About the weight of a car. (ton)

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to recognize symbols and values of the metric system: micro, deci, centi, milli, deka, hecto, kilo, mega. 5-8

ACTIVITIES

---

1. Display and discuss a place value chart showing the value of metric prefixes.

		millions	hundred thousands	ten thousands	thousands	hundreds	tens	ones	tenths	hundredths	thousandths ten thousandths hundred thousandths	millionths
		Mega-			kilo-	hecto-	deka-	meter liter gram	deci-	centi-	milli-	micro-

Then have them complete exercises such as the following:

a. A hectometer is 100 meters.

b. A centigram is 0.01 of a gram.

c. A kiloliter is 1,000 liters.

d. A millimeter is 0.001 of a meter.

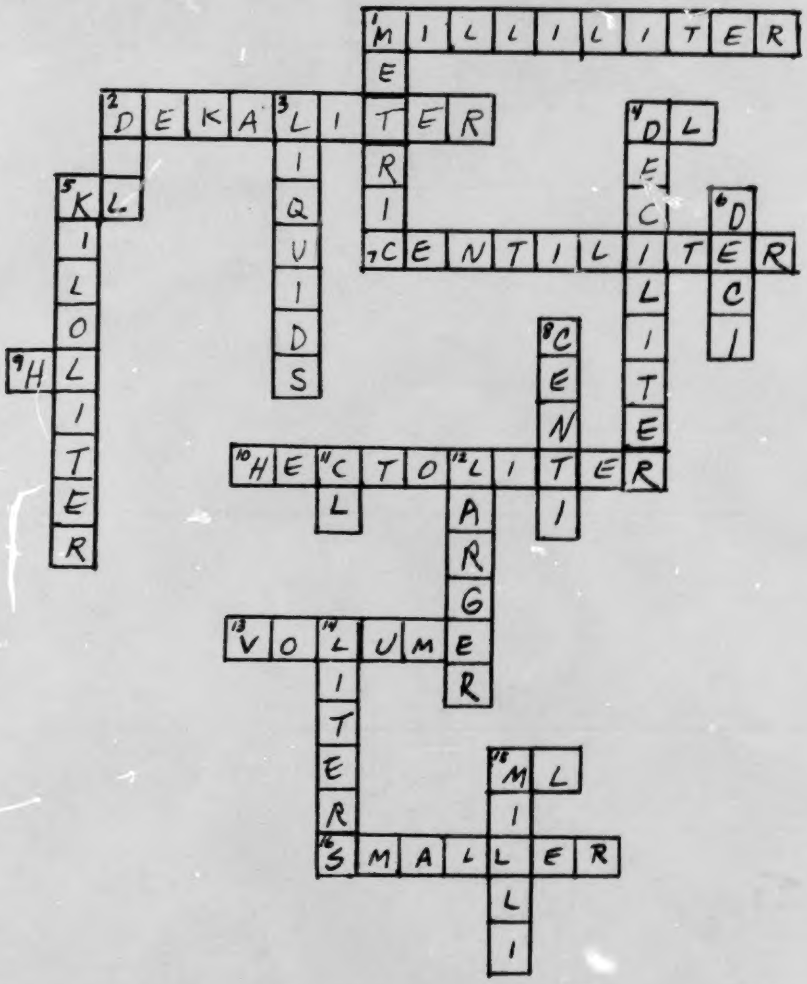
e. A dekaliter is 10 liters.

f. A dekagram is 10 grams.

g. A megameter is 1,000,000 meters.

h. A microgram is 0.000001 of a gram.

2. CROSSWORD PUZZLE


1 MILLILITER
2 DEKALITER
3 LIQUIDS
4 DL
4 DECILITER
5 KL
5 KILOLITER
6 DECI
7 CENTILITER
1 METRIC
2 DL
8 CENTI
9 HL
10 HECTOLITER
11 CL
12 LARGER
13 VOLUME
14 LITERS
15 ML
15 MILLI
16 SMALLER

ACROSS:
1. .001 liter
2. 10 liters
4. Symbol for deciliter
5. Symbol for kiloliter
7. .01 liter
9. Symbol for hectoliter
10. 100 liters
13. A liter is a metric unit of ____________
15. Symbol for milliliter
16. A milliliter is __________ than a liter

DOWN:
1. Most widely used measurement system
2. Symbol for dekaliter
3. Liter is usually used to measure volume of _________
4. .1 liter
5. 1,000 liters
6. Prefix meaning tenth
8. Prefix meaning hundredth
11. Symbol for centiliter
12. A liter is ________ than a centiliter
14. Basic metric unit of volume (plural)
15. Prefix meaning thousandth

3. SEEK AND FIND

```
B C F Q W R G T D E C I R
L E R U T A R E P M E T E
P N T Y L P A T Y M I O T
Q T L K J G M A S S H O I
W I M J L X H E C T O R L
M M S K I L O G R A M A I
L E N G T H J M B Q E K L
Q T W R E L J M B Z T E L
Q E E T R V O L U M E D I
Z R M C E L S I U S R P M
```

deci
hecto
kilo
length
milli
milliliter
meter
volume

mass
gram
kilogram
celsius
liter
root
centimeter

1257

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to convert units of measure in length, area, volume, weight and capacity within the metric system. 5-9 *9

ACTIVITIES

1. Have students complete exercises such as the following. Give metric measurements in the first column. Give equivalent measurements in the second column. Have students find an equivalent in the second column to match each measurement in the first column and put the correct letter in the blank at the left.

C	1.	250 dl	A.	.05 kilometers
G	2.	2.5 g	B.	50 hectograms
F	3.	.5 g	C.	2.5 dekaliters
B	4.	500 dkg	D.	250 meters
J	5.	25 mg	E.	5 kiloliters
H	6.	2.5 l	F.	500 milligrams
E	7.	50 hl	G.	25 decigrams
A	8.	50 m	H.	250 centiliters
I	9.	500 cm	I.	50 decimeters
D	10.	2.5 hm	J.	2.5 centigrams

2. Make a copy of the cards below and cut them out. Fit them together so that all adjacent sides name the same length. For example, 100 cm is next to 1 m. Number or letter the back of each section for self-checking.

430 dm 2 dkm ④ 4 dm 180 hm	43 mm 20 m ⑨ 300 m 3.5 km	.043 hm 200 cm ③ 3 cm .43 hm
4.3 m 100 m ⑧ 200 dm 35 cm	43 km .12 m ② 2 m 35 dkm	350 m .4 m ⑤ 20 hm 43 dm
430 m 2 km ⑥ 20 m 4.3 cm	4.3 dm 3 m ① 12 hm 43 m	18 km 30 dkm ⑦ 1 hm 1000 mm

3. Have the students complete a table of metric measures such as the following:

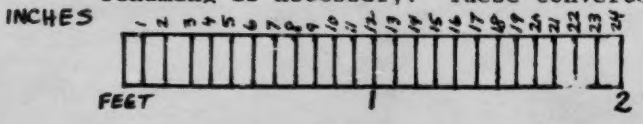
KILO	HECTO	DEKA	GRAM LITER METER	DECI	CENTI	MILLI
.003 km	.03 hm	.3 dkm	3 m	30 dm	300 cm	3000 mm
(.004)	(.04)	(.4)	4 g	(40)	(400)	(4000)
(.005)	(.05)	(.5)	(5)	50 dm	(500)	(5000)
(.005)	(.05)	.5 dm	(5)	50	(500)	(5000)
(.3)	3 hm	(30)	(300)	(3000)	(30,000)	(300,000)
2 km	(20)	(200)	(2000)	(20,000)	(200,000)	(2,000,000)
(.0002)	(.002)	(.02)	(.2)	(2)	(20)	200 mm
(.0067)	(.067)	(.67)	(6.7)	(67)	670 cm	(6700)

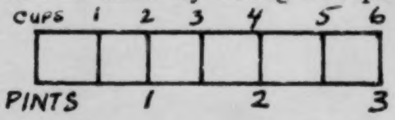
CONTENT: Measurement and Estimation

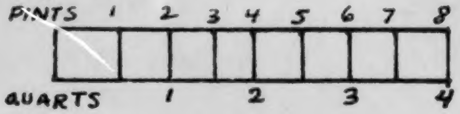
OBJECTIVE: The student will be able to convert linear, square, capacity and weight measurements to equivalent measures within the customary system. 5-9 *9

ACTIVITIES

1. Homemade "converters" can be made for studying units of measure. These are useful in computation when renaming is necessary. These converters can be made by using strips of tagboard.







Use the same procedure for converting quarts to gallons, ounces to pounds, feet to yards, etc.

2. Have students investigate unusual units of measure and report on them. Those units may include:

Cable's length
Chain
Cubit
Fathom
Furlong
Gill
Hand
Hank
Hogshead
League
Noggin
Pottle

3. Prepare a set of cards which will guide a student's exploration in discovering relationships between units of measure. Set aside an area of the classroom where students will have access to a variety of measuring instruments. Make task cards which contain sets of instructions such as the following:

1 pint holds as much sand as _____ cups

3 feet is the same as _____ inches

32 ounces is the same as _____ pounds

1261

1262

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to add and/or subtract customary measures with regrouping. 6-8

ACTIVITIES

1. Give the students a list of places to measure. Have them total distances between several designated places or have them give the difference between distances.

   Examples:

   a. The combined distance between their desk and the pencil sharpener, and the pencil sharpener and the wastebasket.

   b. The difference between the length of the basketball court and the width of the classroom.

2. Have the students create situation problems involving sums and differences in customary measures. Ask them to set up and maintain a permanent measurement corner in the classroom containing as many measuring tools as possible, problems to be solved and a key for checking.

3. Fill a large box with a great assortment of objects. Let the students contribute their "junk" too. Provide rulers, yardsticks, measuring tapes, liquid measuring units (cup, pint, quarter, gallon), scales, pencils and paper. Have the students make personal notebooks for recording estimates and measurements. A student chooses several items from the box and writes an estimate for each. Then he makes the measurement, records his findings and computes the difference between the estimate and the measurement.

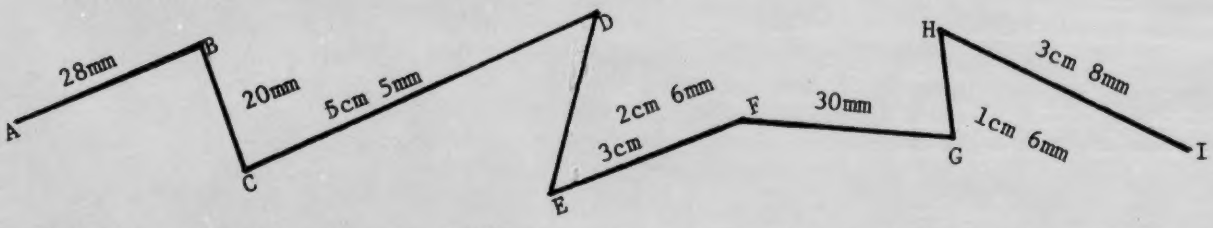
CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to add or subtract measurements of length (weight, mass or capacity) using metric (SI) system. 7-10 *10

ACTIVITIES

1. Have the students get in groups of three or four. Let them weigh and measure each other. Have them add the weights of the group and convert the answers to grams and kilograms. Have them add the heights of the group and give the sum in millimeters, centimeters and meters.

2. Give the students several joined line segments such as the following. Have them measure the segments, find the sum of the segments and give the sum in both millimeters and centimeters.



3. Give the students problems such as the following. Let them add and subtract the problems using groups of ten counters to aid in the regrouping.

46mm
128mm
+ 9mm
183mm
18.3cm
1.83dm
.183m

1m 57cm
+2m 96cm
3m 153cm
4m 53cm
4.53m

149cm
-32cm
117cm
1.17m

6m 23cm 6mm
-2m 35cm 9mm
3m 87cm 7mm

1265

1266

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to designate a measurement as a cardinal number (measure) and word telling things counted (unit of measurement). 7-8

ACTIVITIES

1. Display several articles which may be measured:

   desk
   water
   clock
   thermometer
   calendar
   material
   map
   cake
   bag of sugar
   can of oil
   light bulb
   box of cereal
   shoe box

   Have the students decide what unit of measurement would be used for each. If a cardinal number can be used, show the students the correct way to designate measurement, (i.e., 3 pounds of sugar, 17 miles, 1 quart of oil, etc.).

2. Have the students make a list of things to be measured. Then have them estimate the cardinal number which applies to each. The group may then exchange lists and check each other's for accuracy. Extend this activity to the outdoors. Length of the playground, perimeter of the basketball court, etc., are interesting things for the students to estimate.

3. Show the students various instruments for measurement. These may include a ruler, yardstick, cup, pint, clock, scales. Then let them make lists or draw pictures of things that each may measure. These may be used for a bulletin board for teaching measurement.

1268

1267

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to tell which of two given measurements is more precise. 7-8

ACTIVITIES

1. Have three students measure the width of the classroom: the first student to the nearest meter, the second to the nearest decimeter, and the third to the nearest centimeter. Tell students that the smaller the unit used for a measurement, the more precise the measurement can be. Ask the student to arrange groups of measurements in order from the least to the most precise: 3 cm, 6 km, 0.71 mm, 83 m, 9.8 km.

   Ask students to name the unit of measurement used for each length. Have them give the more precise pairs of measurements.

   a. 726 cm or 7.3 m
   b. 119 mm or 12 cm
   c. 5.0 m or 5 m
   d. 12 cm or 122 mm
   e. 46.3 mm or 4.6 cm
   f. 726 cm or 7.261 m
   g. 12 cm or 12.0 cm
   h. 16 mm or 1.6 m
   i. 19.0 m or 19 m

2. Give students lists of measures to add. Have them express the sums to the least precise measurement.

a.	21.9	cm	b.	15.4	mm	c.	11.6	m
	4.21	cm		11.6	mm		4.17	m
	8	cm		4	mm		3	m
	19	cm		7.92	mm		19	m
	53.11	cm		38.92	mm		37.77	m
	53	cm		39	mm		38	m
d.	1.7	m	e.	0.16	cm			
	3.8	m		0.5	cm			
	4	m		4.0	cm			
	9.6	m		4.19	cm			
	19.1	m		8.85	cm			
	20	m		8.9	cm			

3. Give the students a list of objects to measure both with meters and centimeters. Objects may include the width of the ball, the height of the door, the length of the chalkboard. Discuss with them the more precise measurement of the two and why it is the more precise.

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to tell the greatest possible error of measurement is one-half the unit used for measuring. 7-8

ACTIVITIES

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1. Stand three students against the wall and mark their heights with a piece of chalk. Measure their heights to the nearest inch, the nearest half-inch, and the nearest quarter-inch, respectively. Suppose that their heights are given as 5'2", 4'10½" and 4'11¼". Ask for the unit of measurement and the greatest possible error in each case. These will be inches and 1/2 inch; half inches and 1/4 inch; quarter inches and 1/8 inch, respectively.

   Have students give the greatest possible error for each of the following measurements:

   a. 63 feet (1/2 ft.)
   b. 17 miles (1/2 mi.)
   c. 16-1/2 inches (1/4 in.)
   d. 11-1/8 inches (1/16 in.)
   e. 6-3/16 inches (1/32 in.)
   f. 7.1 inches (.05 in.)
   g. 70 miles (5 mi.)
   h. 6.34 inches (.005 in)
   i. 21.4 yards (.05 yd.)
   j. 76.0 feet (.05 ft.)
   k. 8,000 miles (500 mi.)
   l. 4-0/2 inches (1/4 in.)
   m. 5-2/4 inches (1/8 in.)
   n. 3.125 inches (.0005 in.)

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to show the maximum length or minimum length of a measurement can be found by respectively adding or subtracting GPE to or from the measurement. 7-8

ACTIVITIES

1. Have the students complete charts such as the following:

	Measurement	GPE	Length	Length
1.	8 in. to the nearest in.	1/2 in.	8-1/2 in.	7-1/2 in.
2.	6 cm to the nearest cm.	1/2 cm.	6-1/2 cm.	5-1/2 cm.
3.	3-1/2 in. to the nearest 1/2 in.	1/4 in.	3-3/4 in.	3-1/4 in.
4.	98 m to the nearest m	1/2 m	98-1/2 m	97 1/2 m
5.	8.2 m to the nearest .1 m	.05 m	8.25 m	8.15 m
6.	4.05 m to the nearest .01 m	.005	4.055 m	4.045 m
7.	8-1/3 yd. the nearest 1/3 yd.	1/6 yd.	8-1/2 yd.	8-1/6 yd.
8.	10-3/8 in. to the nearest 1/8 in.	1/16 in.	10-7/16 yd.	10-5/16 yd.

2. Prepare a worksheet having several line segments that are from 8 centimeters to 11 centimeters in length. Give students rulers that have millimeter graduations and have them measure each segment to the nearest decimeter, nearest centimeter, and nearest millimeter. Have them give the range of the exact length for each measurement.

1273

1274

CONTENT: Measurement and Estimation

OBJECTIVE: The student will be able to relate temperature in degrees to hot, cold or comfortable. 7-8

ACTIVITIES

1. Write these temperatures on 30 separate cards: 1°C, 2°C, 3°C, 6°C, 7°C, 8°C, 9°C, 10°C, 12°C, 13°C, 15°C, 17°C, 24°C, 30°C, 40°C, 0°C, -1°C, -2°C, -3°C, -4°C, -7°C, -8°C, -9°C, -11°C, -16°C, -21°C, -22°C, -25°C, -28°C, -40°C. Two students shuffle the cards and deal 15 cards face down to each. Each student draws the top card from his/her pile and turns it over. The player with the card naming the warmer temperature keeps both cards. The winner is the student with the most cards after all 30 have been drawn.

2. Give the students exercises such as the following. Have them give the present temperature.

   A. Starts at -40°C
   Falls 2°C
   -42°C

   B. Starts at +21°C
   Falls 20°C
   1°C

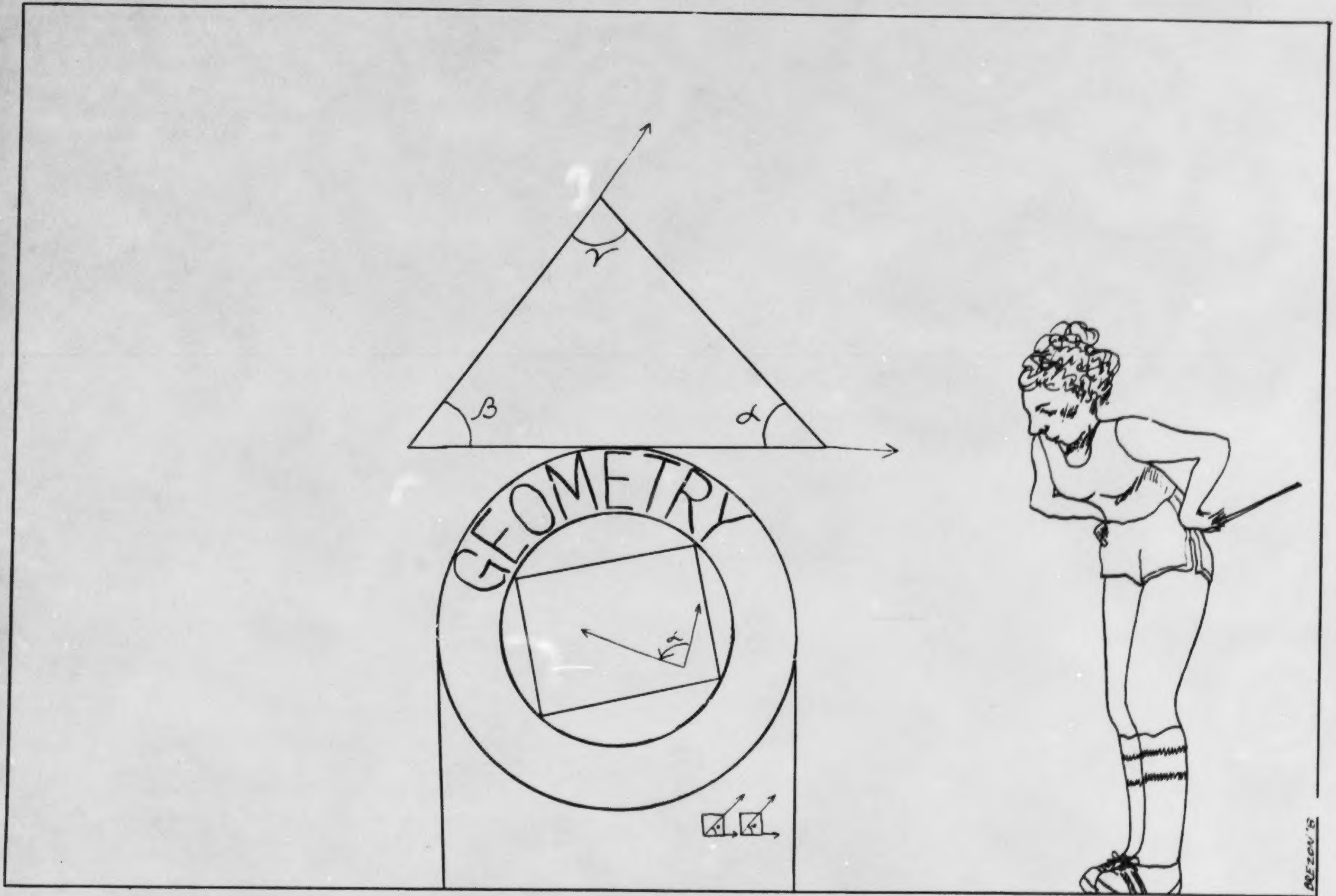
   C. Starts at -6°C
   Rises 8°C
   2°C

   D. Starts at 16°C
   Rises 12°C
   28°C

3. Let the students make a gameboard with a thermometer marked to show -25°C to 25°C, and 2 cards for each of the following:

   Rises 1°C
   Falls 1°C
   Rises 2°C
   Falls 2°C
   Rises 3°C
   Falls 3°C
   Rises 4°C
   Falls 4°C
   Rises 5°C
   Falls 5°C
   Rises 6°C
   Falls 6°C

   Shuffle the cards and stack face down between two students. Each student places a marker on 0°C. Taking turns, each student draws a card and moves the marker as indicated on the card. When all cards have been drawn, the student whose marker is on the warmer temperature wins.


γ
β
α
GEOMETRY
α
BREZON '8

1277

1278

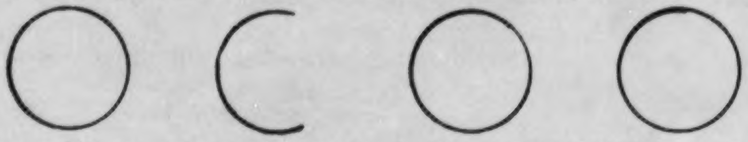
CONTENT: Geometry

OBJECTIVE: The student will be able to distinguish between an open and a closed figure. K-1

ACTIVITIES

1. Using the yarn let the children form open and closed figures on the flannelboard. Have the students guess whether the figure displayed is open or closed. The child who answers correctly gets to form the next figure.

2. Draw four figures such as the following on the chalkboard:

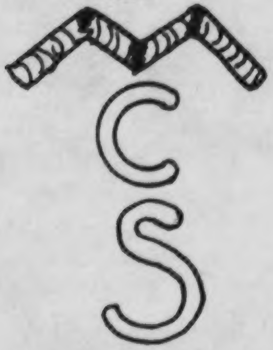


Ask the children to tell which one does not belong. Point to each of the circles and say that they are closed. Point to the other figure and say that it is open (not closed). Help children to see that it has two ends that do not meet. It may help some children to think of the figures as fences. On the figure that is different, tell them that someone left the gate open, and on the circles, tell them the gate is closed so no one can get in or out.

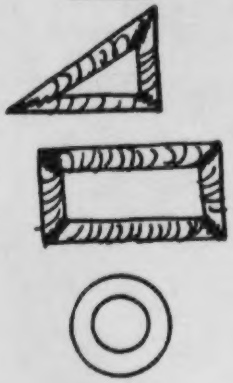
Draw other figures on the chalkboard, one at a time, and have children tell whether they are closed or not closed.

3. Have children use sticks, balls of clay, straws, or pipe cleaners to construct a variety of closed and open figures. Display these in two groupings.

OPEN



CLOSED



CONTENT: Geometry

OBJECTIVE: The student will be able to distinguish between inside and outside of a closed figure. K-3

ACTIVITIES

1. Use Lincoln Logs, fence pieces that come with a model farm or similar objects to construct a fence on the floor or table. Place animal models inside the fence and discuss the position of the animals. Have the children move some of the animals through a gate to the outside. Ask appropriate questions to guide your children into a discussion of what is meant by inside and outside the fence. Following this activity have the children draw objects, inside and outside of it.

   Materials: Lincoln Logs or similar objects, animal objects

2. Make a circle on the floor. Have the children stand around it. Give directions and ask questions such as the following:

   Michael, stand inside the circle.
   Where is Michael standing?
   Where are we standing? (outside the circle)
   Now, Michael, stand outside the circle.
   Who is standing inside the circle? (no one)
   John, Jim, Bob, stand inside the circle.
   Where is John standing?
   Girls, stand inside the circle.
   Everyone stand outside the circle.

   Materials: Rope, yarn, clothesline, chalk or masking tape

3. Play the game, Tossing the Bean Bag. A circle made of rope, yarn, chalk, or a hoop may be used. The children take turns tossing a bean bag into the circle. They tell where the bean bag lands: inside, outside, or on the circle. The children should stand a reasonable distance away from the circle.

   Materials: Bean bag, circle made of rope, yarn, or chalk

CONTENT: Geometry

OBJECTIVE: The student will be able to identify the following simple closed figures - circle, triangle, rectangle, square. K-1 *1

ACTIVITIES

1. Have the children arrange the shapes on sheets of construction paper to form representations of people, animals, houses, trees and other things. Have them paste the shapes in place and display their pictures.

   Materials: Various sizes and colors of circles, squares, triangles, rectangles cut from construction paper; sheets of construction paper, paste or glue.

2. Have the students play this game in groups of two to four. One child deals five cards to each player, then rolls the cube. If the student has a card for the shape shown on the cube, the student lays it down. The cube is then passed on to the next player. A player who doesn't have a card for the shape shown on the cube must draw from the pile of remaining cards until getting an appropriate card. The first player to run out of cards wins.

   Materials: Deck of 36 cards, each showing a square, circle, rectangle, or triangle, cube with square, circle, triangle and rectangle on the faces.

3. Have one student at a time reach into the box, pick up a shape, feel it, and name it without looking, then take it out to check the guess. Continue in the same way until the box is empty. Then have the students return the shapes to the box, naming each shape as they replace [illegible]

   As a variation, have a student select and hide a shape from view, then give hints until someone guesses what shape it is.

   Material: Large covered box called "The Mystery Box," set of heavy cardboard shapes of circle, triangle, rectangle and square.

CONTENT: Geometry

OBJECTIVE: The student will be able to recognize shapes: sphere, rectangular prism, cylinder and cone. K-3

ACTIVITIES

1. Play "I Spy." Say, I see a shape. It's flat at one end with a point at the other end. The rest of it is rounded. It is the shape I sometimes see for holding ice cream. What do I spy? Continue with the other shapes.

   (Variation) Cut and paste pictures of articles with given shape.

2. Provide the children with several spheres, rectangular prisms, cylinders and cones. Ask, How are the shapes alike and different? Encourage the children to distinguish between "curved" (or rounded) surfaces and "flat" ones. Ask, Which rectangular prism or cylinder do you think holds the most? Which holds the least? Use sand, popcorn, or other material to verify responses.

3. Have the children close their eyes. Have them identify the shapes by feel. Ask them to list everyday objects like the shapes. Have the children collect some of the objects for a display.

1285 1286

CONTENT: Geometry

OBJECTIVE: The student will be able to recognize colors and group according to color. K-1 *1

ACTIVITIES

1. Introduce one color to the students. (Example: red) Go on a red color walk. When you return have students tell you the names of things they saw that are the color red. Build a red color word wall. Do the above activities for all colors.

2. Give students a piece of newsprint with a red square at the top. Have students cut and paste red pictures from magazines and catalogs on the piece of newsprint. Write the names of the things they cut and paste under the pictures.

3. Label several plastic containers with color words. Collect assorted colored blocks, beads, and pictures and place in a box. Have students sort the objects and pictures according to color.

CONTENT: Geometry

OBJECTIVE: The student will be able to classify objects or pictures according to color and shape.

K-1 *1

ACTIVITIES

1. In order to classify small objects, the children may work individually, with partners, or in groups of not more than four. Give each child or group a sorting tray (aluminum muffin pan or egg carton) and ten or more small objects (buttons, marbles, cards, blocks). Have the children classify the objects according to shapes.

   Materials: Variety of small objects which can be classified according to shapes, sorting tray.

2. Display a record, round wastebasket, or other circular object. Then have the children identify other objects in the room that are round. Repeat with triangular, square and rectangular objects. Later, display one geometric shape at a time and have the children identify as many objects of that shape as they can.

   Help the children pick out pictures of various round objects to paste on a piece of tagboard. Repeat for triangular, square and rectangular objects. Finally, display a piece of a tagboard showing pictures of objects that have various easily recognizable shapes. Have the children choose the geometric shape that corresponds with each picture and lay it on the picture.

   Materials: Various circular, triangular, square and rectangular objects; pictures cut from magazines or catalogs; tagboard; paste, geometric cutouts including circles, squares, triangles and rectangles.

3. Make a set of sturdy cards in the shape of a circle, rectangle, square, and triangle. Ask the children to look around the classroom or have them bring something from home that is the same as the shape of any one of the cards. Have the children classify the objects according to shapes.

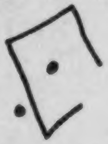
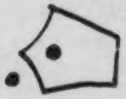
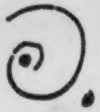
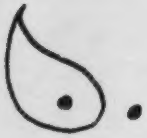
   Materials: Poster board or tagboard.

CONTENT: Geometry

OBJECTIVE: The student will be able to recognize paths as open or closed. 1-3

ACTIVITIES

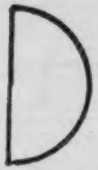
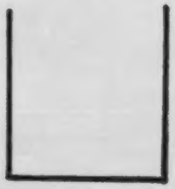
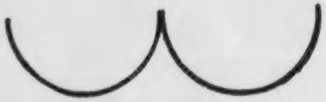
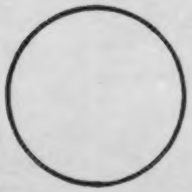
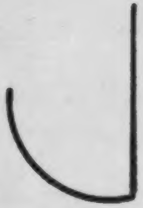
1. Draw figures such as the following on the chalkboard:

Ask the students to try to find a way to draw a line from the dot outside to the dot in the inside without crossing a line. Have them distinguish between the open figures and the closed figures.

2. Provide two large sheets of white construction paper (12" x 18") for each child. Have students draw one large simple closed curve and one large complex closed curve. Ask students to trade both papers with someone and make the simple closed curve into a picture of a person, object or scene; make the complex closed curve into a colorful design, using a different pattern in each section of the figure. "Wallpaper" the math center with the pictures.

3. Give each child a piece of art paper with an open curve or a simple closed curve on it.

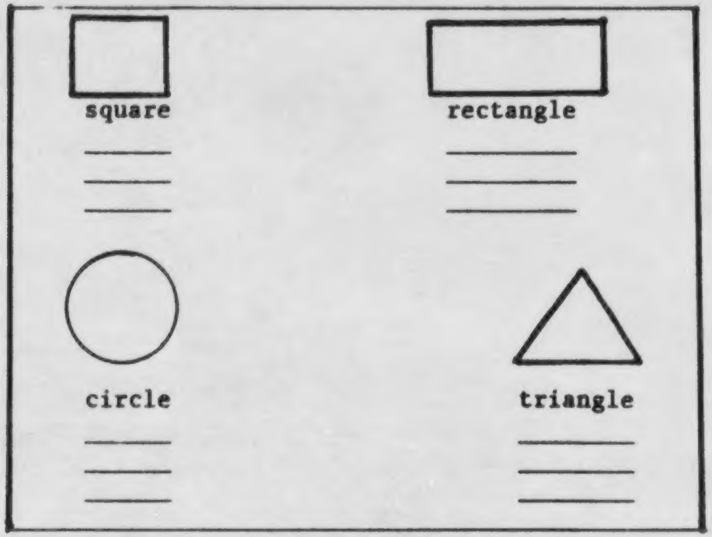
Have them use the shape and draw a picture for display.

CONTENT: Geometry

OBJECTIVE: The student will be able to identify and associate the words circles, triangles, squares and rectangles with their visual representation. 1-3 *3

ACTIVITIES

1. Provide the following worksheet. Ask students to locate things in the classroom that have these shapes and record them under the picture.



2. Provide a box full of construction paper cutouts of squares, rectangles, triangles, and circles. Give each student a specific assignment such as: construct a picture using 6 circles, 4 triangles, 5 squares, and 2 rectangles. Display pictures on the bulletin board.

3. Make a set of cards with shapes (circle, square, triangle, rectangle) on them. Teach students to play Concentration.

1294

1293

CONTENT: Geometry

OBJECTIVE: The student will be able to draw a facsimile of a circle, triangle, square and rectangle. 1-3 *3

ACTIVITIES

1. After introducing a circle to the class, go on a circle hunt. Have students name things they saw shaped like a circle. Develop a circle word wall by listing all the things they found with that shape. Let students select several of the objects to illustrate and make a "circle book." Do the above activities for triangle, square, and rectangle.

2. On slips of paper, write instructions such as the following:

   a. Draw a picture using two circles, three squares, one triangle, and two rectangles.

   b. Draw a picture using four circles, one square, three triangles, and one rectangle.

   Let students draw their assignments.

3. Provide patterns for the shapes. Let students trace and label the circles, squares, rectangles, and triangles.

1296

1295

CONTENT: Geometry

OBJECTIVE: The students will be able to identify and draw representations of lines, segments, rays.

3-4 *4

ACTIVITIES

1. After students have had the initial introduction to points, line segments, lines and rays, ask them to draw and label a representation of each.

2. Have students write the name of each diagram.

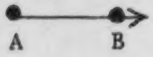
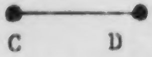
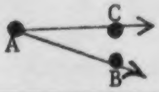
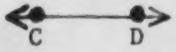
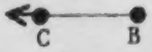
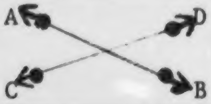
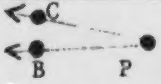
DIAGRAM	NAME
A	Point A
	?
	?
	?
	?
	?

DIAGRAM	NAME
	?
	?

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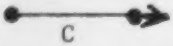
3. Have students write A, B, C, or D to match the name with a picture.

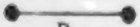
a. Point _____

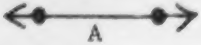
b. Line segment _____

c. Line

d. Ray _____


C


D


A

B

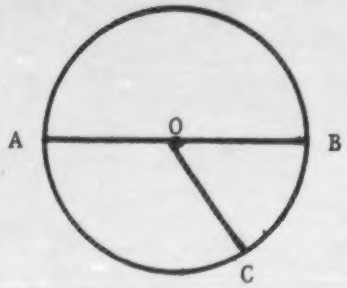
CONTENT: Geometry

OBJECTIVE: The student will be able to identify the parts of a circle: 4-5 *5

(1) center
(2) radius
(3) diameter
(4) circumference
(5) semi-circle

ACTIVITIES

1. Draw a circle using a compass. Mark the center, and have the class label the points where it intersects the circle as A and B. Write the word diameter above the line segment AB. Do the same for the center and radius of the circle.



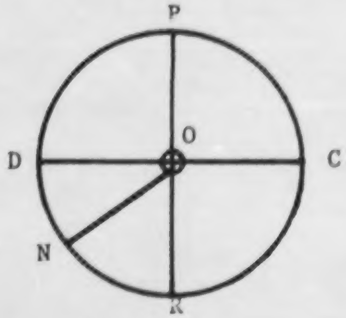
$\underline{O}$ is the center of the circular region

$\overline{OB}$, $\overline{OC}$, $\overline{OA}$ are all radii of the circle

$\underline{\overline{AB}}$ is the diameter of the circle

2. For the circle drawn name the following and measure the line segments in centimeters.

a.	the center	O
b.	a radius	$\overline{ON}$, $\overline{OR}$, $\overline{OD}$, $\overline{OP}$, or $\overline{OC}$
c.	two diameters	$\overline{PR}$, $\overline{DC}$



Have students discuss the practical applications of the circle and its importance to society. Discuss ideas introduced by students and have them prepare a display for the bulletin board.

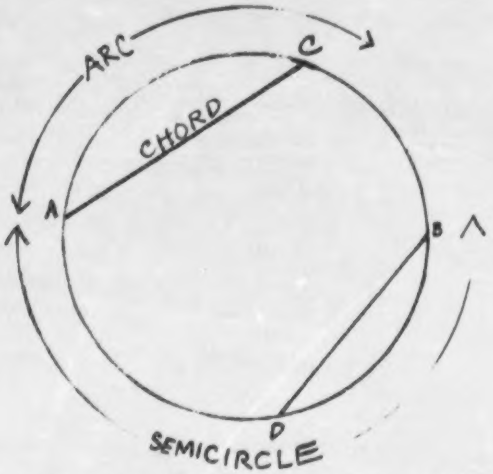
3. Have students use compasses or chalkboard to draw circles of various sizes. Then have students draw these parts on their circles, center, radius, diameter.

CONTENT: Geometry

OBJECTIVE: The student will be able to demonstrate an understanding of circles by identifying chord, arc, and semi-circle. 5-8

ACTIVITIES

1.



Using a compass, or string and chalk, draw a circle on the chalkboard and then draw the other parts as you recall their names. Draw attention to the symbols for arc and semicircle. Explain that when two points are chosen on a circle, two arcs are determined. In general, when an arc is named using two letters, the smaller, or minor, arc is meant. A semi-circle is always named with three letters to be certain which of the two is meant.

a. Name the other arcs shown in this circle. ($\overset{\frown}{CB}$, $\overset{\frown}{BD}$, $\overset{\frown}{DA}$)

b. Name the other chord shown for this circle. ($\overline{BD}$)

c. Name the other semi-circle that is shown. ($\overset{\frown}{ABC}$)

2. Have each child draw a circle with four lettered points on it. Have them exchange papers and list all the arcs and semi-circles on the circle. Then have them draw all the chords that could exist within the circle. Exchange papers again and check the work.

3. Draw a circle on the chalkboard as illustrated in activity 1. Have each child draw a circle on construction paper. Let the children glue yarn on their circles to show each part as you discuss them. Color code the arcs, semi-circles, and chords with the yarn. Example: All arcs in blue yarn, semi-circles in red, and chords in yellow.

CONTENT: Geometry

OBJECTIVE: The student will be able to identify parallel and intersecting lines. 4-6 *6

Introduce the concept of parallel lines using sticks or drawings on the chalkboard to represent parallel lines. Parallel lines, no matter how far extended, do not meet.

1. Have students find examples of parallel lines in the classroom. Show a map of your city or town, have students name pairs of streets that are parallel.
2. Choose a street on the map. Have students imagine that the street has railroad tracks running alongside. Have students name streets that cross the tracks at right angles. Then have them name streets that are parallel to the tracks.
3. Have students find pictures that represent parallel lines and create a bulletin board display (e.g., TV antennas, telephone wires).

CONTENT: Geometry

OBJECTIVE: The student will identify horizontal and vertical lines. 4-6 *6

ACTIVITIES

1. After introducing horizontal and vertical lines to the class have students locate horizontal and vertical lines around the classroom. Have students determine whether the following are horizontal or vertical lines:

    a. the top of the doorway
    b. the side of the window
    c. the baseboard

2. Write the following on slips of paper:

    a. three horizontal lines, four vertical lines
    b. five horizontal lines, five vertical lines
    c. six horizontal lines, eight vertical lines

    Let students draw slips of paper and construct designs using the number of vertical and horizontal lines indicated.

3. Take the students on a "nature walk." Have them identify things that are vertical and horizontal in nature.

1310

1311

CONTENT: Geometry

OBJECTIVE: The student will be able to:

1. identify perpendicular lines. 5-7 *7
2. identify and use intersecting, oblique (skew), parallel, and perpendicular lines 5-8

ACTIVITIES

1. Have the students find the types of lines formed by the capital letters of the alphabet. Have them categorize them under three headings. Some letters will fit into more than one category.

   Parallel: E, F, H, M, N, W, Z
   Perpendicular: B, E, F, G, H, J, L, R, T
   Oblique: A, K, M, N, V, W, Y, Z

2. Supply the students with straws or toothpicks. Have them create a mobile containing parallel, perpendicular, intersecting, and oblique lines. They may ask the other students to point out at least one pair of each type.

3. Have students find pairs of parallel, perpendicular, and oblique lines. Students record their findings by drawing a picture and describing the pairs of lines.

1313

1312

CONTENT: Geometry

OBJECTIVE: The student will be able to draw an angle and label the vertex and sides. 4-7

ACTIVITIES

1. Have the students draw various size angles by giving instructions such as the following:

   A. Draw a ray. Call it $\overrightarrow{BP}$.

      Draw $\overrightarrow{BZ}$.

      What is the vertex?

      Name the sides.

   B. Draw $\overrightarrow{AB}$. Draw $\overrightarrow{AC}$.

      Name the vertex.

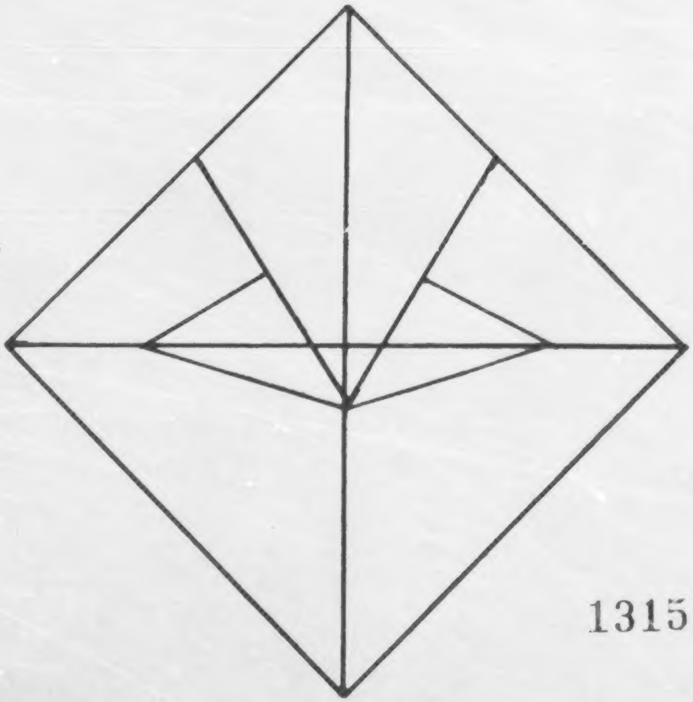
      Name the sides.

   C. Draw $\overleftrightarrow{MJ}$. Draw $\overrightarrow{JN}$.

      Name the vertex.

      Name the sides.

2. Give the students a geometric design such as the following:



1314

1315

Have them find and label all the angles (vertex and sides).

3. Have the students point out areas of the classroom that form angles. Have them point out the sides and the vertices of the angles. They may also use the fingers on their hands to show angles.

CONTENT: Geometry

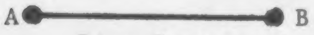
OBJECTIVE: The student will be able to identify an angle, the parts of an angle, and a right angle.

4-6 *6

ACTIVITIES

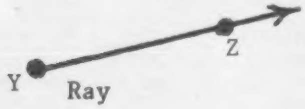
1. Prepare a bulletin board or poster to introduce vocabulary relevant to angles and their parts. Use yarn models to demonstrate each term. Cut two rays from paper, put them on the overhead to show that the union of two rays forms any angle from a straight to a 90° angle.

WHAT'S YOUR ANGLE?



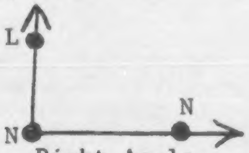
Line Segment

A line segment is straight. It has two end points. Call it line segment AB or BA. Write $\overline{AB}$.



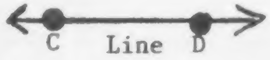
Ray

A ray is part of a line. It has one endpoint. Call it ray $\overrightarrow{YZ}$. (Name the endpoint first.) Write $\overrightarrow{YZ}$.



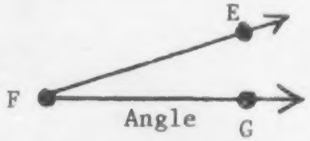
Right Angle

An angle whose measure is 90° is called a right angle. It is often shown with a square in the corner.



Line

A line has no end points. Call it line CD or DC. Write $\overleftrightarrow{CD}$.



Angle

Two rays with the same endpoint form an angle. The endpoint is the vertex. Call it angle EFG, angle GFE or angle F. Write $\angle EFG$, $\angle GFE$, or $\angle F$.

2. Have students draw twelve small circles. Each circle should be filled in like a clock face. Have students draw hands on the clocks to show four right angles, four acute angles and four obtuse angles.

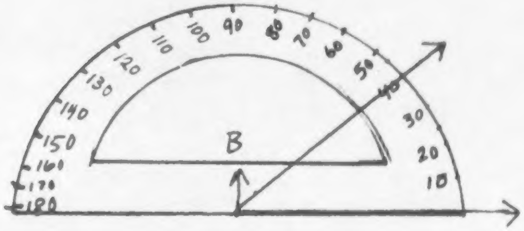
3. Have students make a right angle tester. They should fold a piece of paper, then fold it again, matching the folded edges. The folded corner is the right angle tester. Have them measure angles on objects around the room to test for right angles. After they have worked with objects, they should be ready to test for right angles on a worksheet.

CONTENT: Geometry

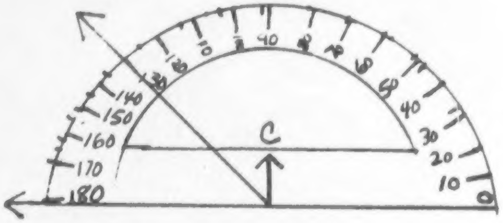
OBJECTIVE: The student will be able to use a protractor to measure an angle in degrees. 5-7 *7

ACTIVITIES

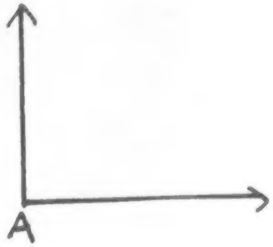
The unit for measuring angles is the degree. A right angle is 90 degrees. Angle A is a right angle. We use a protractor to measure angles.


B
10
20
30
40
50
60
70
80
90
100
110
120
130
140
150
160
170
180

The size of Angle B
is 40 degrees


C
0
10
20
30
40
140
150
160
170
180

The size of Angle C
is 130 degrees



1. Using a protractor construct angles for the following degrees:

   a. 30° c. 70°
   b. 90° d. 120°

2. Have students draw three triangles. Measure the three angles of each triangle. Find the sum of the angles of each triangle. (180°)

3. Distribute protractors to students and demonstrate their use in measuring angles. Distribute a duplicated sheet with angles of various sizes drawn on them. Have students practice using their protractors to measure these angles.

CONTENT: Geometry

OBJECTIVE: The student will be able to use a protractor to measure angles correctly within two degrees. 6-8

ACTIVITIES

1. Have the students use their protractors to measure angles on the windows, door, floor tiles, desks, and other objects in the classroom. Discuss which angle is most commonly found.

2. Have students draw a line with a straightedge. Using a protractor, they find its measure. Distribute sheets that show angles that measure 36°, 144°, 50°, 130°, 55°, 125°, 80°, and 100° in random order. Students find the measure of each angle and write the pairs of angles that fit together along a line.

3. Have each student draw four angles. The student uses a protractor to find the measures of the angles, and records the measures on a separate piece of paper. Students exchange the papers showing the angles, then find and record the measures of these angles. Papers are returned, and the angles are compared. If the two measures are not the same, each student measures again.

CONTENT: Geometry

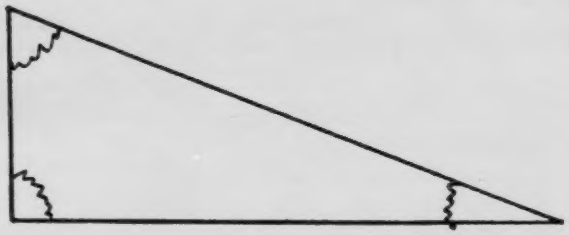
OBJECTIVE: The student will be able to find the measure of the third angle of a triangle when given the measures of the other two angles. 6-8

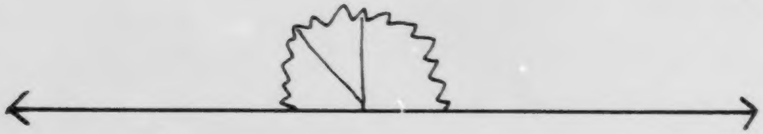
ACTIVITIES

1. Write the measure of each of the angles of 5 triangles on 15 separate cards and shuffle. Have students group the angles to form 5 triangles.

2. Have students complete activity 1. Have students use a protractor and straightedge to draw each triangle.

3. Have students draw and cut out 5 triangles. They carefully tear off the vertices of one triangle and paste them on a line drawn on another sheet of paper. Repeat for the other triangles.





1327

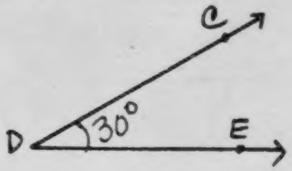
1326

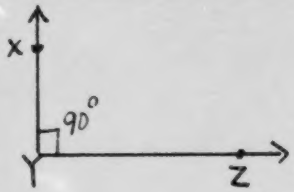
CONTENT: Geometry

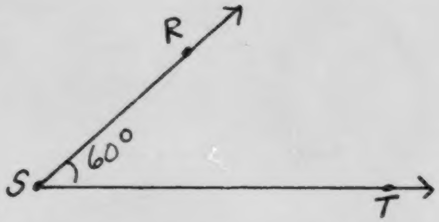
OBJECTIVE: The student will be able to identify and use right, congruent, opposite, and alternating angles. 6-8

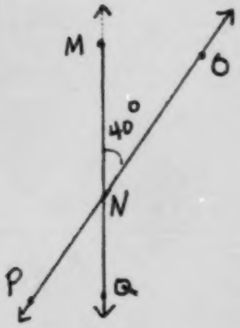
ACTIVITIES

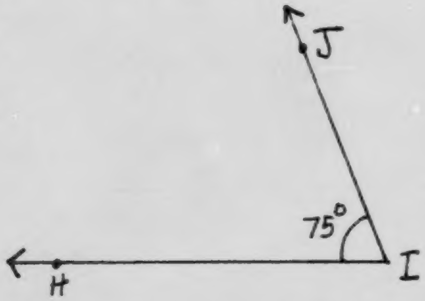
1.

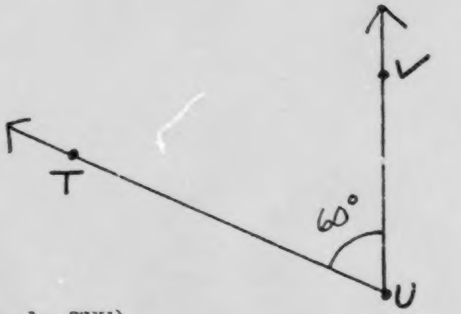












(1) Which of these angles is a right angle? (angle XYZ)

(2) Which two of these angles are congruent? (angle RST and angle TUV)

(3) Which two of these angles are opposite angles? (angles PNQ and MNO; angles MNP and QNO)

2. Design a rug using geometrical patterns and label all the right angles "R," congruent angles "C1,C1," "C2,C2," and opposite angles "01,01," "02,02."

3. Draw a clock. The two hands of the clock suggest an angle.

   a. What kind of angle is formed at 3 o'clock? (right angle)

   b. What time would form an angle congruent to 3 o'clock? (9 o'clock)

   c. Extend the hands of the clock at 2:15 to form an opposite angle. What time is it? (7:45)

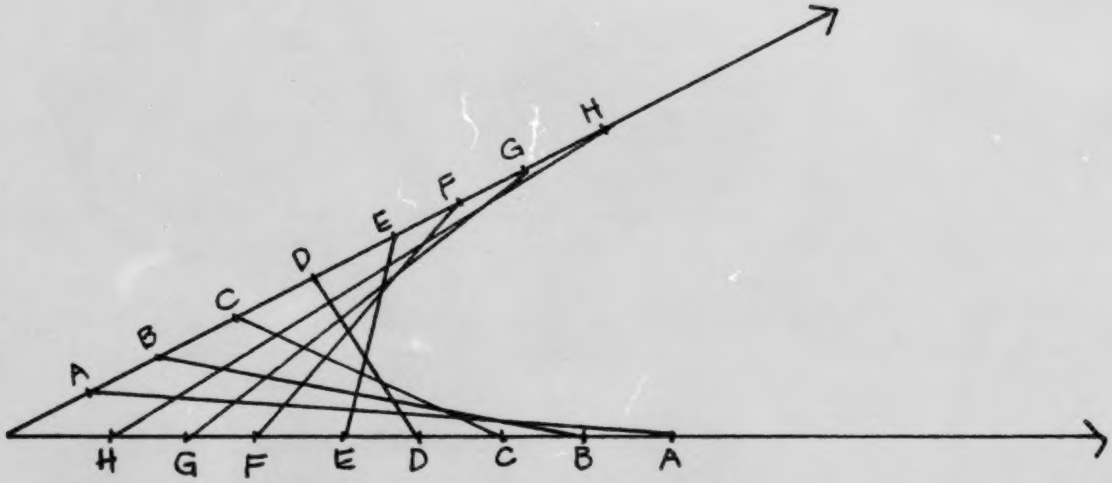
CONTENT: Geometry

OBJECTIVE: The student will be able to classify angles (acute, obtuse, right and straight). 5-8 *8

ACTIVITIES

1. On 30 cards draw 10 right angles, 10 acute angles, and 10 obtuse angles. Shuffle the cards and deal 10 to each of three players. Each places a card from his or her hand face up on the table and tells whether the angles are right, acute, or obtuse. If two players have the same kind of angle, the third player gets to keep all three cards. If each player has a different kind of angle, or if all three are the same, each keeps his or her own card. The player with the most cards at the end of the playing time is the winner.

2. Have students draw an angle. Along each ray mark off centimeter intervals, up to 8 cm. Starting from the vertex label the dots on one ray, H - H. Using a straightedge, draw lines to connect dots which are labeled the same. Students can experiment with other angles and color and design for display. Identify the right angles, acute angles, and obtuse angles in your design.



3. Have the students make clocks from paper plates with movable hands. Call out various times for them to show on the clocks and tell whether the angle formed by the hands is obtuse, right, or acute.

1332

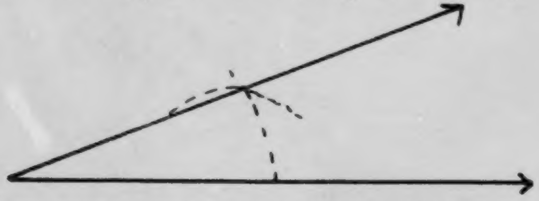
1331

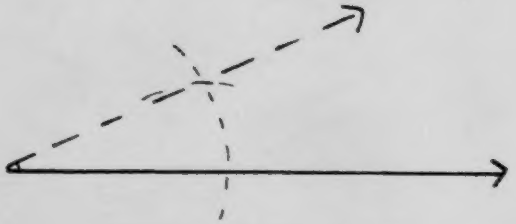
CONTENT: Geometry

OBJECTIVE: The student will be able to copy an angle using a straightedge and compass. 6-8

ACTIVITIES

1. Give the steps to following in copying an angle.





Given angle to be copied onto this ray.

Use your compass to draw a part of a circle through the given angle and with the same radius draw a similar arc across the ray as illustrated. Then determine the amount of opening in the given angle and transfer this to the construction. With this information the angle can be completed.

Students may wish to check the accuracy of their work. They may do so by tracing one angle on tracing paper and then shifting the tracing over the other angle or by measuring with a protractor.

CONTENT: Geometry

OBJECTIVE: The student will be able to construct and label points, lines, line segments, rays, angles, and planes. 5-8

ACTIVITIES

1. Give directions such as the following to the students one at a time. Students compare and discuss the drawings.

   a. Draw $\overleftrightarrow{AG}$.

   b. Put your pencil on point G. Draw $\overrightarrow{GY}$.

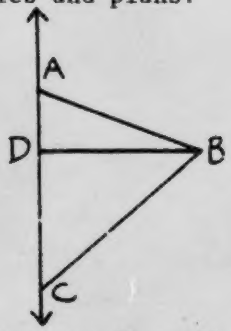
   c. Put your pencil on Y. Draw $\overrightarrow{YL}$.

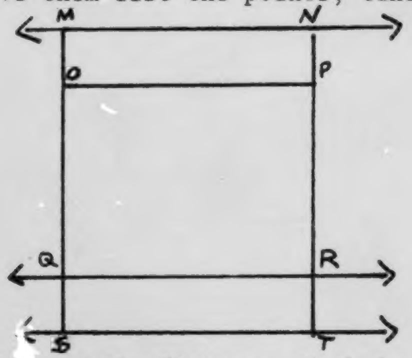
   d. Put your pencil on L. Draw $\overleftrightarrow{LS}$.

   e. Put your pencil on G. Draw $\overrightarrow{GT}$.

   f. Name all the angles.

2. Give the students shapes such as the following. Have them list the points, lines, line segments, rays, angles and plans.





3. A large chart or flannelboard display consisting of geometric figures and their names will help children become more familiar with them. A "mix and match" game played with the geometric figures and their names is an interesting way to learn the names of those shapes which seem most difficult to remember.

CONTENT: Geometry

OBJECTIVE: The student will be able to recognize congruent figures. 5-7 *7

ACTIVITIES

Prepare a box with many shapes cut out with multiple copies of the various sizes and shapes. Let students select a handful of shapes and determine which of these are congruent figures

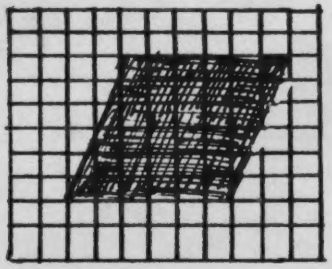
1. Demonstrate congruent figures on the chalkboard (example: two triangles that are the same size and shape).
2. Provide graph paper for students to play Copy My Figure. One student will draw a closed figure with straight sides on the graph paper. The second child must draw a congruent figure.
3. See activity 1.

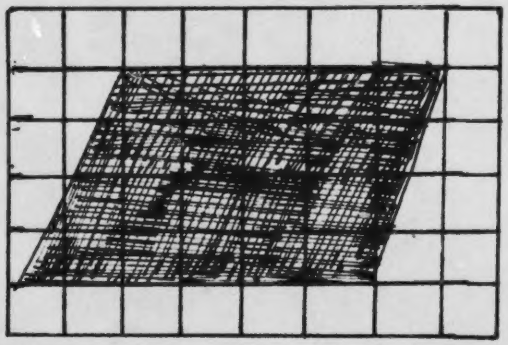
CONTENT: Geometry

OBJECTIVE: The student will be able to recognize similar polygons. 6-8 *8

ACTIVITIES

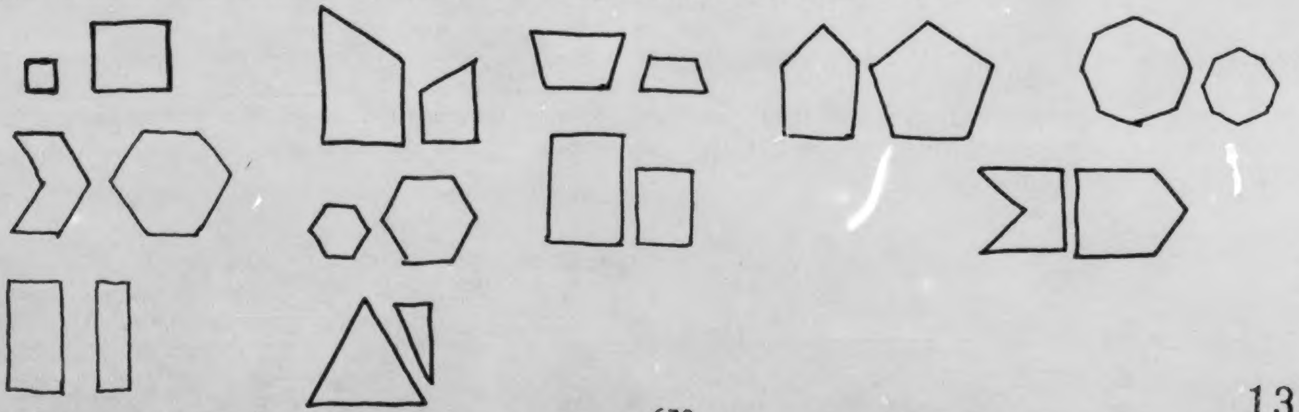
1. Each student will need two sheets of graph paper. The squares on one sheet must be a different size from those on the other sheet. Have the students draw a figure on one sheet. Using the same number of squares for the corresponding sides, they draw similar figures on the second sheet. For example:





2. Set up a project of using equal ratios to find the height of such things as the school flagpole, a tree, the school or the like. Give the students the opportunity to go outside on a sunny day and actually measure shadows and set up ratio problems to find the heights.

3. Cut out several pairs of similar figures. Have the students work together to discover which pairs are similar and which pairs are not. Sample pairs are shown below:



CONTENT: Geometry

OBJECTIVE: The student will be able to compute the perimeter of a triangle, square and rectangle. 4-5 *5

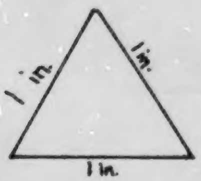
ACTIVITIES

1. Discuss with students situations where one might be interesting in knowing the distance around a shape. (Examples: building a fence, a dog pen, making a path around a building, sewing fringe around a tablecloth.) Have students identify models of these shapes found in the classroom and compute the perimeter by adding up the length of each side.

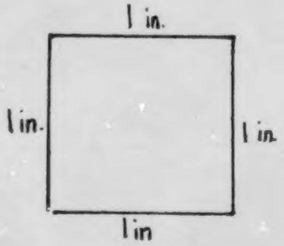
2. Have students use rulers to measure around the tops of their desks, chairs, and books. Have them measure to the nearest unit and add to find the perimeter.

3. Draw shapes of the square, triangle and rectangle on a sheet of paper. Have the student compute the perimeter.

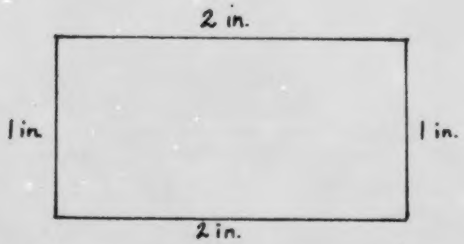
Example:



1
1
+ 1
3 inches



1
1
1
+ 1
4 inches



2
2
1
+ 1
6 inches

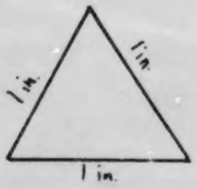
CONTENT: Geometry

OBJECTIVE: The student will be able to identify perimeter and determine by counting the units along the sides of a two-dimensional figure. 4 *4

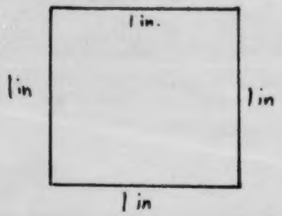
ACTIVITIES

1. Discuss with students situations where one might be interested in knowing the distance around a shape. (Examples: Building a fence, a dog pen, making a path around a building, sewing fringe around a tablecloth.) Have students identify models of these shapes found in the classroom and compute the perimeter by adding up the length of each side.

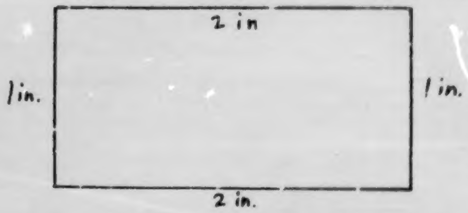
2. Draw shapes of the square, triangle and rectangle on a sheet of paper. Have the student compute the perimeter. Example:



1
1
+ 1
3 inches



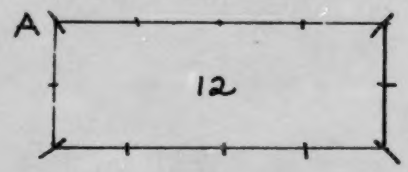
1
1
1
+ 1
4 inches



2
2
1
+ 1
6 inches

3. On the chalkboard, draw a rectangle that is four of your hand spans wide and two hand spans tall. Mark the sides. Show the children that the spaces between the marks on the rectangle all equal one hand span.

Example: Starting at A, the distance around the rectangle is 12 hand spans.

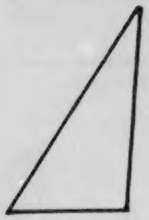


CONTENT: Geometry

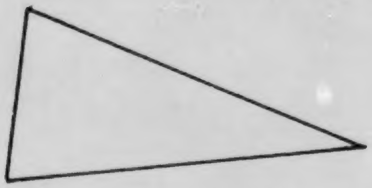
OBJECTIVE: The student will be able to compute the perimeter of the triangles (scalene, isosceles, equilateral). 7-10 *10

ACTIVITIES

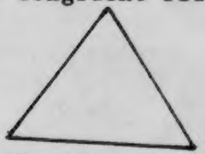
Remember the classifications scalene, isosceles and equilateral are made on the basis of the lengths of the sides.



Scalene - sides of different lengths.



Isosceles - two congruent sides.



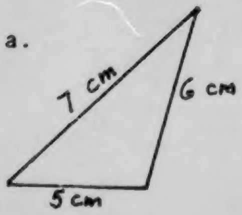
Equilateral - all sides congruent.

1. Compute the perimeter for the following triangles using the formulas.

$P = 2a + b$

$P = a + b + c$

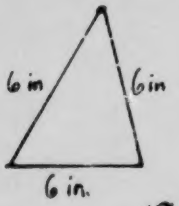
a.



18 cm

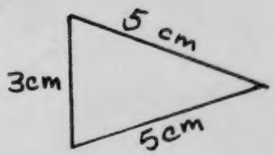
$P = 3s$

b.



18 in

c.



2. Provide students with more problems to compute perimeters of triangles using formulas. Have students construct problems using formulas.

3. Have students make a bulletin board display of the three types of triangles using different color yarn for the display. Discuss with students that they will need to use three different lengths of yarn for a scalene triangle, two equal lengths for an isosceles triangle, and three equal lengths for an equilateral triangle.

CONTENT: Geometry

OBJECTIVE: The student will be able to compute the perimeter of quadrilaterals (parallelogram, rhombus, trapezoid). 6-8

ACTIVITIES

Remember that the perimeter of a figure is the distance around the figure. The formulas are:

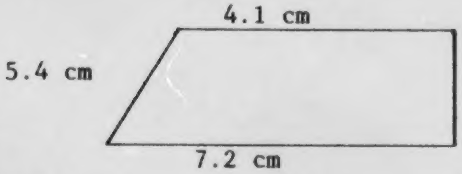
$P = a + b + c$

$P = 2\ (l+w)$

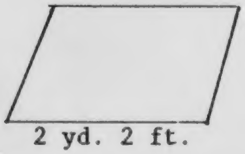
$P = 4s$

Compute the perimeter for the following figures:

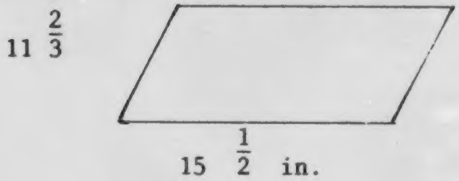
1.


4.1 cm
5.4 cm
7.2 cm

20.2 cm



10 yd. 2 ft.


$11\ \frac{2}{3}$
$15\ \frac{1}{2}$ in.

$54\ \frac{1}{3}$ in.

2. Provide students with a catalog that gives the cost of fencing. Have students measure the school yard and determine the cost to completely fence it in. Make sure that they include the correct number of posts and at least two gates.

CONTENT: Geometry

OBJECTIVE: The student will be able to compute the circumference of a circle using the formula: $C = \pi \times d$ or $C = 2\pi r$ (use either 3.14 or 22/7 as an approximation for π (pi). 5-8

ACTIVITIES

1. The formula for finding the circumference is C = x d. is approximately equal to 3.14.

   Example: $C = \pi \times d$ The diameter of the circle is 7 meters.

   $C = 3.14 \times 7$

   $C = 21.98$ m.

   $C = \pi \times d$ The circumference of a circle with a radius (r) of 6 centimeters.
   $C = 3.14 \times (2 \times 6)$
   $C = 3.14 \times 12$
   $C = 37.68$ cm.

   Find the circumference of each circle. The diameter or radius is given.

   a. d = 8m (25.12m)
   b. r = 3 cm (18.84 cm)
   c. r = 7m (43.96m)
   d. d = 10m (31.40m)

2. Have students determine the circumference of a bicycle wheel. Ask them to compute how many complete revolutions the wheel would turn if the bicycle traveled one mile. Use the appropriate formula.

3. Supply the students with some round containers, such as tin cans. Have students measure the diameter of each can and then measure the circumference. To measure the circumference, they could wrap a string around the can as shown, mark the string, and then measure the distance between the two marks. Have them keep a record of their findings. Discuss with students the fact that the circumference of a circle is a little more than 3 times the diameter.

CONTENT: Geometry

OBJECTIVE: The student will be able to identify the area of a square and a rectangle by counting the square units enclosed. 4 *4

ACTIVITIES

1. Use two pieces of construction paper in contrasting colors to demonstrate covering a region with square units. Use one piece as the region to be measured. Cut the other piece into unit regions. Tell the students that finding the area of the paper means finding the number of small squares that will cover it. Have a student cover the paper with the squares. Ask, "What is the area of the paper?"

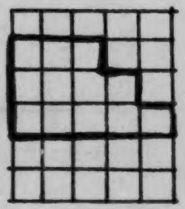
2. Have students shape a square of the following units.

   Example:

   (1) 9
   (2) 16
   (3) 25
   (4) 36

3. Give students a sheet of graph paper on which several shapes have been drawn. Have students find the area of each shape. If geoboards and rubber bands in different colors are available, use them to show different figures.

   Example:



1356

1355

CONTENT: Geometry

OBJECTIVE: The student will be able to compute the area of a square and a rectangle using the appropriate formula. 5-6 *6

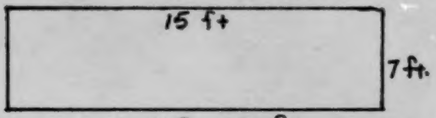
(1) Rectangular region - $(A = L \times W)$

(2) Square - $(A = S^2)$

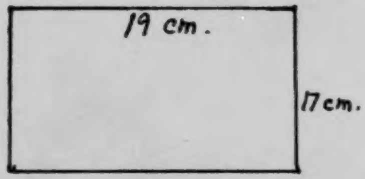
ACTIVITIES

NOTE: The area measure is equal to the product of the measures of its length and width.

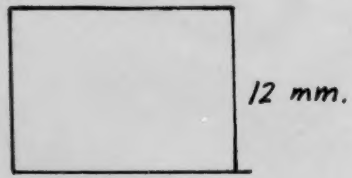
1. Find the area of each figure below.

a. 

105 sq. ft

b. 

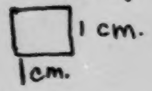
323 sq. cm.

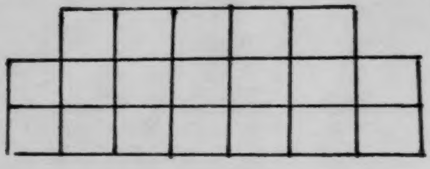
c. 

144 sq. mm.

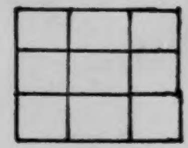
2. Have the students find the area of the classroom; then have them find how much it would cost to carpet the classroom with wall-to-wall carpeting.

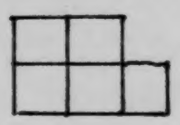
*Carpeting for the classroom costs $12.99 per square meter. What will it cost to carpet the room?

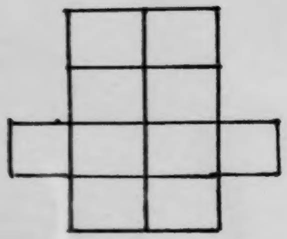
3. The area of a shape is the surface inside it. We may find the area by counting the square units. The square unit used is the square centimeter. For example: 

Area = 19 sq. cm 

a. What is the area?





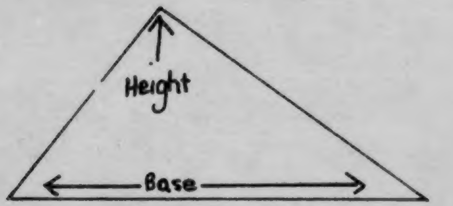


CONTENT: Geometry

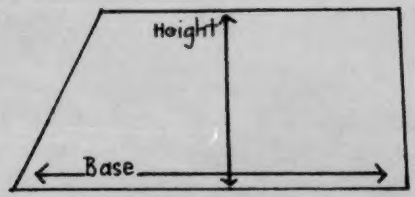
OBJECTIVE: The student will be able to identify the altitude and base of triangles and a parallelogram. 6-7 *7

ACTIVITIES

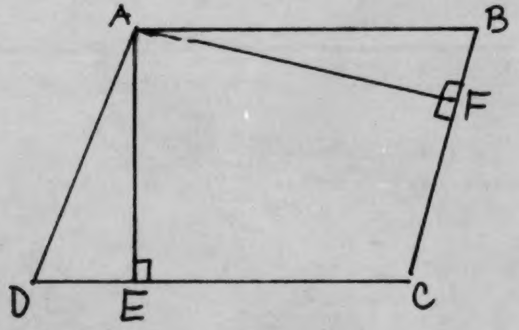
Use a cardboard pattern to draw a triangle on the board similar to the one below. Label the base and height as shown.

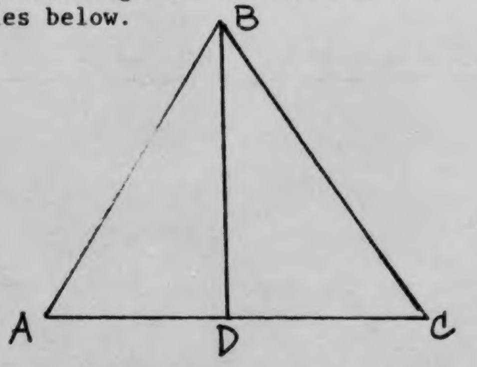


Construct a flexible parallelogram using cardboard strips and brass fasteners. Hold it up in an almost flat position for the class to see. Make a parallelogram from a sheet of construction paper and indicate the base and height.



Have the students agree that the triangle and the parallelogram have the same base and height. Provide further experiences for students as shown in examples below.





CONTENT: Geometry

OBJECTIVE: The student will be able to compute the area of a triangle. 7-9 *9

ACTIVITIES

1. Have the students create different sized triangles on centimeter graph paper. By counting the squares, students estimate the area of the triangles. Then they use the formula $A = \frac{1}{2} b h$, to confirm their answers.

2. Have students use centimeter graph paper to construct the triangles below.

   a. $b = 4$ cm (2 cm^2)
   $h = 1$ cm

   b. $b = 10$ cm (45 cm^2)
   $h = 9$

   c. $b = 2$ cm (3 cm^2)
   $h = 3$ cm

   d. $b = 8$ cm (28 cm^2)
   $h = 7$ cm

   e. $b = 3.6$ cm (5.22 cm^2)
   $h = 2.9$

   f. $b = 4.3$ (6.02 cm^2)
   $h = 2.8$ cm

   Then they use the formula $A = \frac{1}{2} b h$ to find the area of each triangle.

3. Give each student centimeter graph paper. Have them use crayons to make any design which meets the following requirements.

   a. 12 square centimeters - blue

   b. 15 square centimeters - red

   c. 24 square centimeters - green

   d. 30 square centimeters - yellow

   e. 32 square centimeters - black

   f. 35 square centimeters - purple

1362

1361

CONTENT: Geometry

OBJECTIVE: The student will be able to compute the area of a parallelogram. 7-9 *9

ACTIVITIES

1. Have students use centimeter graph paper to create different paralleograms with areas of 10, 15, 18, 20, 22, and 24 square centimeters. They may use the formula A = b h to confirm their findings.

2. Have the students draw and cut out 10 parallelograms with a base of 6 cm and a height of 3 cm. They use these to completely cover a 12 cm by 15 cm piece of paper. Some of the parallelograms will be cut. The designs may be colored and displayed.

3. Students need 5 paper parallelograms with the dimensions listed below. Each one should be a different color. Have students arrange them in order from the one which they think has the greatest area to the one which they think has the least area.

   They list the colors of the parallelograms in this order. Each student measures the parallelograms, and finds the area of each. Then the student lists the colors of the parallelograms in order, from greatest area to least area and compares the two lists.

   a. b = 8 cm, h = 7 cm (56 square cm)

   b. b = 9 cm, h = 6 cm (54 square cm)

   c. b = 10 cm, h = 5 cm (50 square cm)

   d. b = 7 cm, h = 5 cm (35 square cm)

   e. b = 6 cm, h = 8 cm (48 square cm)

1364

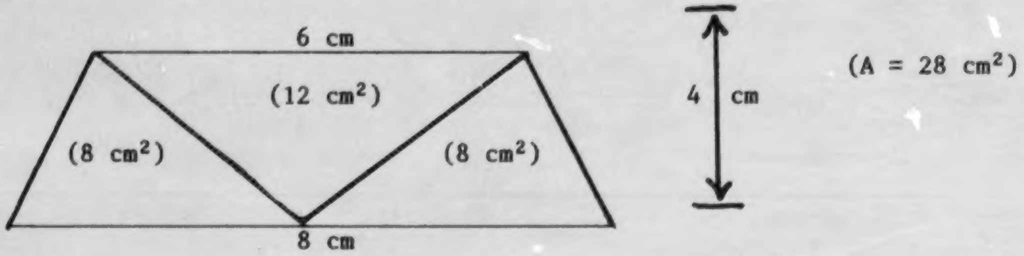
1363

CONTENT: Geometry

OBJECTIVE: The student will be able to find the area of a trapezoid using the formula $\frac{1}{2}h\ (a+b)$. 6-8

ACTIVITIES

1. Draw the figure below. Have the students find the area of the trapezoid. Then they find the area of each figure inside the trapezoid. They add to find the total area of the figures inside the trapezoid.



2. Students will need a 20 cm by 20 cm piece of centimeter graph paper. Students work in pairs. Each writes these areas on slips of paper: 18 cm^2, 15 cm^2, 24 cm^2, 46 cm^2, 28 cm^2, 4 cm^2, 7 cm^2, 74 cm^2, 25 cm^2, and 75 cm^2. Taking turns, students choose a slip of paper and draw a rectangle, parallelogram, triangle, or trapezoid with that area on the graph paper. The student to fill up the most area on the graph paper after all slips of paper are drawn (without overlapping), wins.

3. Give the students copies of a centimeter grid. Cut out various sizes of trapezoids for each of the students. Have the students place the trapezoids on the grids and count the square units in each.

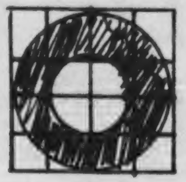
CONTENT: Geometry

OBJECTIVE: The student will be able to compute the area of a circle using the formula $A = \pi r^2$. 7-9 *9

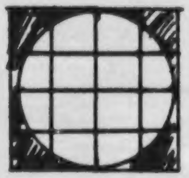
ACTIVITIES

1. Give the students exercises such as the following:

   Each of the large squares below measures 4 cm by 4 cm. What is the area of the shaded part?



(9.42 cm²)



(3.44 cm²)

2. Ask the students to contact a local pizza parlor and find out the prices and diameters of pizzas of various sizes. Then have them find the area of each pizza and how much that pizza costs per square unit of area, to determine which size pizza is the best buy.

3. Ask the students to find some objects in the classroom that have circular regions, such as a paper cup, paint bottle, cans. Then have the children trace around the objects on graph paper and estimate their areas by counting squares. Afterward, they can measure the diameter or find the radius and apply the formula to find the area of each region.

CONTENT: Geometry

OBJECTIVE: The student will be able to find the volume of a shape by counting the cubic units that will fit inside it.

ACTIVITIES

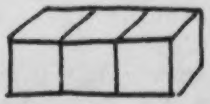
1. Using counting blocks or sugar cubes have students work in pairs with sets of blocks. One student makes a shape with the blocks, the other tells how many cubic units it contains. Explain: We call the amount of space in a shape its volume. We can measure the volume of a shape by finding how many cubic units will fit inside it. Have students do several illustrations using the blocks.

2. Have students find the missing numbers, using blocks to help.

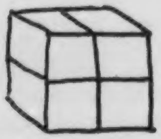
	Length	Width	Height	Volume	
(1)	2	2	1	?	4
(2)	3	2	4	?	24
(3)	4	2	?	16	2
(4)	2	?	4	24	3
(5)	3	5	2	?	30
(6)	3	3	?	27	3

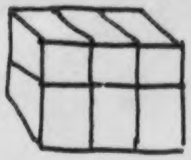
3. Show students different shapes with the same volume. Include a few with different volumes. Ask the students to write "same" or "different."

Example:

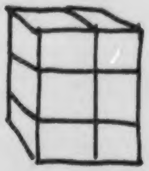


different





same



CONTENT: Geometry

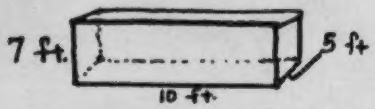
OBJECTIVE: The students will be able to compute the volume of a cube and a rectangular prism. 5-10 *10

ACTIVITIES

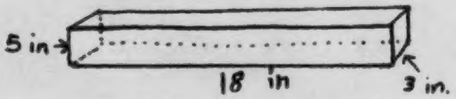
---

1. The volume measure of a rectangular prism is equal to the product of the measure of its length, its width, and its height (V = l x w x h). The volume of a cube is equal to the $V = S^3$.

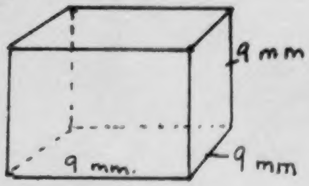
Find the volume of each rectangular prism.



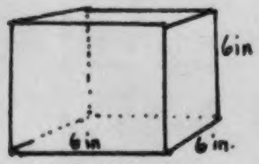
350 cu. ft.



270 cu. in



729 cm. mm



216 cu. in.

2. Find the volume of each rectangular prism whose length, width, and height are listed.

	Length	Width	Height	Volume
(1)	6 ft.	5 ft.	9 ft.	270 cu. ft
(2)	3 m.	2 m.	5 m.	30 cu. m.
(3)	4.2 cm.	3.1 cm.	5.4 cm.	70.308 cc.
(4)	62 in.	31 in.	10 in.	19,220 cu. in.
(5)	9½ ft.	3½ ft.	4½ ft.	149-5/8 cu. ft.

Find the volume of a cube using the formula $V = S^3$ whose sides are 3.1 cm. (Answer 29.791 cc.)

3. Find the volume of the rectangular prisms using the formula $V = l \times w \times h$ and $V = S^3$.

a. $l = 3$ in.
$w = 4$ in.
$h = 6$ in.

b. $l = 6$ ft.
$w = 7$ ft.
$h = 5$ ft.

c. $S = 5$ ft.

1373

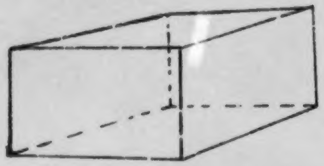
CONTENT: Geometry

OBJECTIVE: The student will be able to identify and use various formulas for finding the volume of solid figures; prisms, pyramids, cylinders, cones, and spheres. 6-8

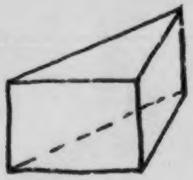
ACTIVITIES

1. Match the pictures with the formulas for volume.

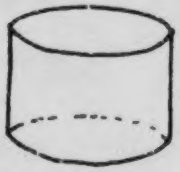
Rectangular Prism



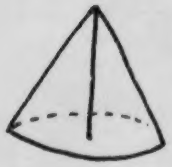
Triangular Prism



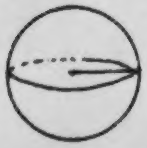
Cylinder



Cone



Sphere



$V = \frac{4}{3} \times \pi \times r^3$

$V = B \times h$
$(B = \pi \times r^2$

$V = B \times h$
$(B = b \times h)$

$V = B \times h$
$(B = \frac{1}{2} \times b \times h)$

$V = 1/2 \times B \times h$
$(B = \pi \times r^2)$

2. Same as above.

3. Have the children bring boxes, food cans, etc., to class to find the volume of each.

CONTENT: Geometry

OBJECTIVE: The student will be able to identify the parts of a right triangle. 7-9 *9

ACTIVITIES

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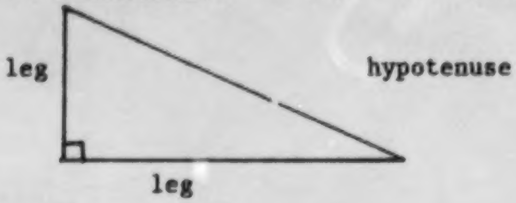
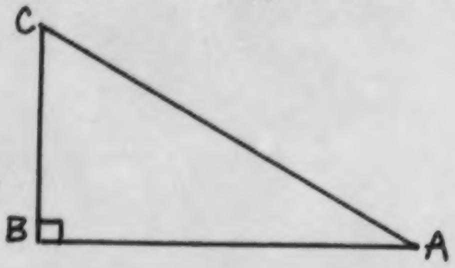
1. The sides of a right triangle have special names. The longest side, the one opposite the right angle, is called the hypotenuse. The other two sides are called the legs.

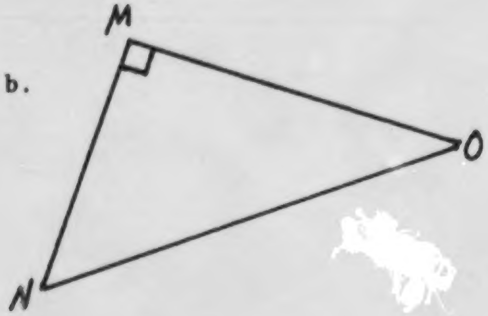


Which side is the hypotenuse of each figure?

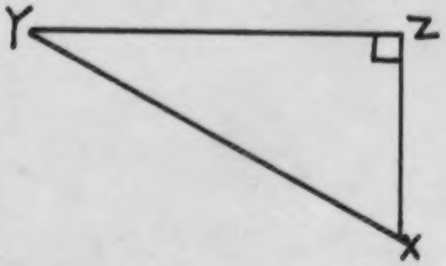
a.



b.



c.



1378

1377

CONTENT: Geometry

OBJECTIVE: The student will be able to classify triangles according to sides (isosceles, equilateral, scalene). 7-9 *9

ACTIVITIES

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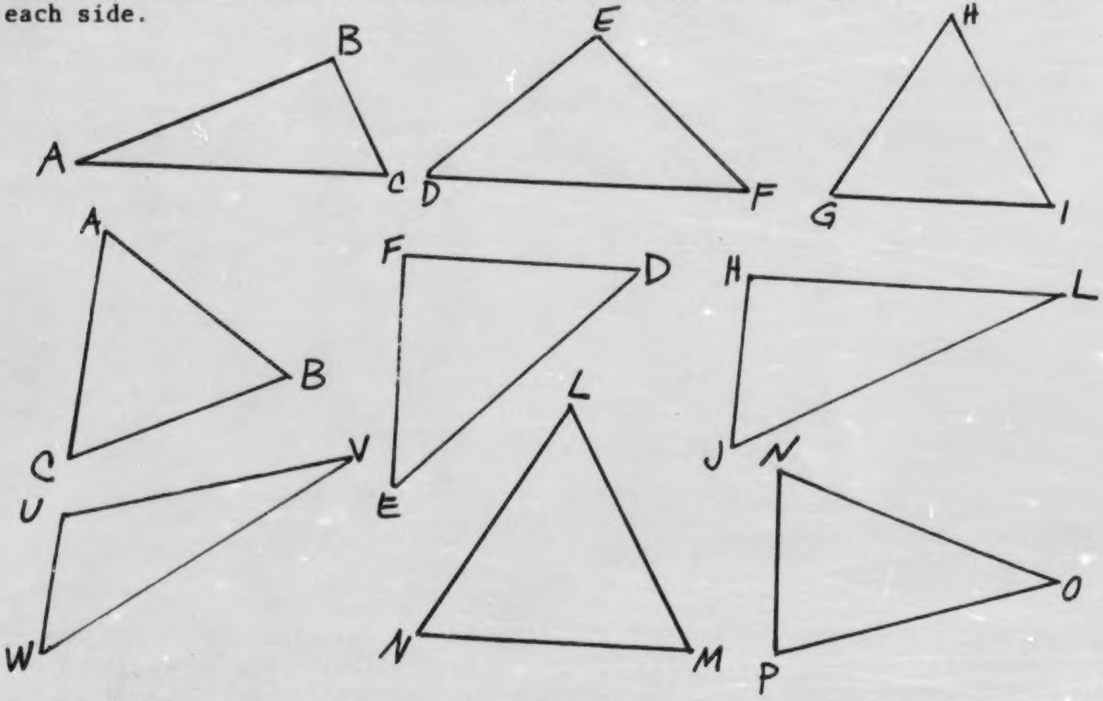
1. Have the students use models to demonstrate that all equilateral triangles are isosceles, but that not all isosceles triangles are equilateral.

2. Have the students use rulers to measure each of the triangles in millimeters and record the length of each side.



Have them compare the sum of the lengths of any two sides of a triangle with the length of the third side. Elicit the conclusion that the sum of the lengths of any two sides must be greater than the length of the third side.

3. On 30 cards draw 10 scalene triangles, 10 isosceles triangles and 10 equilateral triangles. Shuffle the cards. Three players may play, each getting 10 cards. Each player places a card face up on the table and tells whether the triangles are scalene, isosceles, or equilateral. If two players have the same kind of triangle, the third player gets to keep all three cards in a pile. If each player has a different kind of triangle, or if all three are the same, each keeps his or her own card in a pile. The player with the most cards in a pile at the end of the allotted time wins.

CONTENT: Geometry

OBJECTIVE: The student will be able to classify triangles according to their angles. 7-9 *9

ACTIVITIES

1. Have the students complete an exercise containing the four kinds of triangles according to angle size. Have them classify the triangles as acute, right, obtuse or equiangular by measuring the angles with a protractor. Ask them what they discovered about the sum of the measures of the triangles.

2. Ask the students if the following are acceptable classifications for triangles. If so, draw an example; if not, why not?

   a. right obtuse

   b. scalene isosceles

   c. obtuse equilateral

   d. acute equilateral

   e. isosceles acute

   f. equiangular scalene

3. Let the students construct triangle mobiles which will reveal the classifications of triangles.

CONTENT: Geometry

OBJECTIVE: The student will be able to use various formulas to find the surface area of a rectanglar prism and a cylinder. 6-8

ACTIVITIES

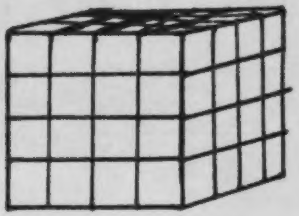
1. Have students make a rough sketch of each figure and number or letter its sides. They can list these numbers or letters and compute the area of each face to avoid forgetting any computation. Have students compute surface areas of the following rectangular prisms.

	A	B	C	D	E
width	1	2	3	4	5
length	2	4	6	8	10
height	3	6	9	12	15

2. Let students find the surface area of a large cube constructed from 64 small cubes. Tell them that the surface of the large cube is to be painted. Have them find how many of the smaller cubes will have:

   a. No faces painted (8)
   b. 1 face painted (24)
   c. 2 faces painted (24)
   d. 3 faces painted (8)

   Students find the total number of faces of the smaller cubes that will be painted. (6) Have students find the surface area of the large cube if the dimensions of each small cube are 1 cm by 1 cm by 1 cm. (96 cm^2) For a challenge, students can find the number of faces that will not be painted. (288)



1386

1385

3. Have the students bring in containers having the shapes of rectangular prisms and cylinders. A student writes his or her name on the container and on a card. The student also writes the surface area on the card. Put the containers and cards in a display area. During free time, students can measure the dimensions and find the surface areas of various containers. They they find the corresponding cards to check their answers.

If a student finds the surface area of all figures, then he or she may wish to arrange them in order from least to greatest.

1387

1388

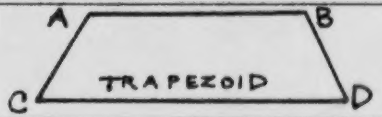
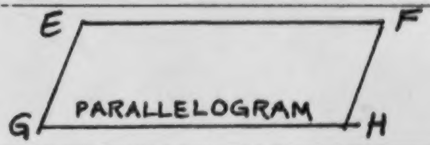
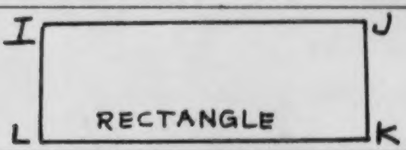
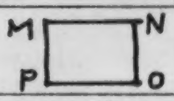
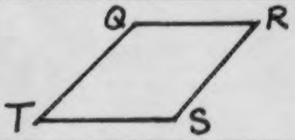
CONTENT: Geometry

OBJECTIVE: The student will be able to identify types of quadrilaterals (trapezoid, parallelogram, rhombus). 5-8 *8

ACTIVITIES

1. Have the students fold papers into five sections. They write the names of these quadrilaterals in the sections: rhombus, square, rectangle, parallelogram, and trapezoid. On 25 cards, draw examples of the quadrilaterals. Put the cards in a box. Taking turns, students draw a card and place it in the correct section. They return the card to the box if they cannot use it. The first student to collect all five shapes wins.

2. Have students complete the missing information in the chart.

Quadrilateral	Opposite Sides	Parallel Sides	Congruent Sides
		$\overline{AB} \parallel \overline{CD}$	
			$\overline{EF}$ and $\overline{HG}$ $\overline{EG}$ and $\overline{FH}$
	$\overline{IJ}$ and $\overline{LK}$ $\overline{IL}$ and $\overline{JK}$		
			All Sides
			

3. Cut out six each of the following shapes: square, rectangle, parallelogram, rhombus, and trapezoid. Make the shapes different sizes and different colors. Hide five copies of each in the room before the students arrive. Distribute the remaining geometric shapes to five children or five pairs of children to use as a guide in hunting for shapes the same as the ones they were given.

CONTENT: Geometry

OBJECTIVE: The student will be able to identify and draw a quadrilateral, parallelogram, rectangle, square, rhombus, pentagon, hexagon, octagon. 6-8

ACTIVITIES

1. Draw the picture.

POLYGON	DESCRIPTION	PICTURE
Quadrilateral	Any polygon with four sides.	
Parallelogram	Opposite sides are congruent. Opposite angles are congruent.	
Rectangle	Opposite sides have the same length. All angles are right angles.	
Square	All sides have the same length. All angles are right angles.	
Rhombus	All four sides have the same length.	
Pentagon	Any polygon with five sides.	

POLYGON	DESCRIPTION	PICTURE
Hexagon	Any polygon with six sides.	
Octagon	Any polygon with eight sides.	

1395

CONTENT: Geometry

OBJECTIVE: The student will be able to identify and use parallel and perpendicular planes. 6-8

ACTIVITIES

---

1. Lead the students to discover examples of parallel and perpendicular planes in the classroom. Divide the class into teams. Have each team list as many examples as they can. Let the teams share the examples they have listed.

2. Have the students list examples of shapes which would show 4 intersecting planes, 5 intersecting planes, 6 intersecting planes.

   Examples:

   4 - pyramid
   5 - pup tent
   6 - room

3. Supply the students with an assortment of magazines with colorful pictures. Have the students find and cut out examples of parallel and perpendicular planes.

1397

1396

CONTENT: Geometry

OBJECTIVE: The student will be able to recognize a cube, cylinder, a sphere, cone and pyramid. 3-8 *8

ACTIVITIES

1. Show objects or pictures of objects shaped like cubes, cylinders, spheres, cones, and pyramids. Include in the display some items that do not belong to any of the categories. Have students sort the objects or pictures and match them with each shape. Have students find examples of these shapes around the school.

2. Draw a picture of each shape on a chart with a slot under each shape. Write the name of each shape on a card. Have students match the name with the shape.

3. Play a game "What's This Shape?" Place models of objects in a box. Have a student select an object without letting anyone see it. Other students try to guess the object by asking questions. The student with the object can answer only yes or no. The student who guesses correctly may make the next selection and the game continues.

1399

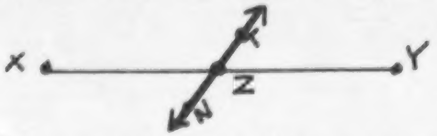
1398

CONTENT: Geometry

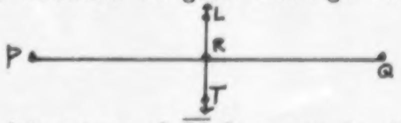
OBJECTIVE: The student will be able to identify the following basic geometry constructions: bisector of line segment, bisector of an angle, perpendicular lines and congruent figures. 7-10 *10

ACTIVITIES

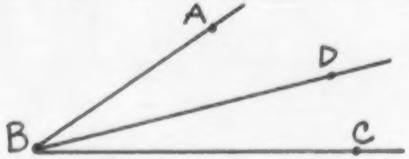
C is the midpoint of $\overline{AB}$ because $\overline{AC}$ and $\overline{CB}$ are congruent. We say C bisects $\overline{AB}$.



$\overleftrightarrow{NT}$ is the bisector of $\overline{XY}$ because it goes through the midpoint Z of $\overline{XY}$.

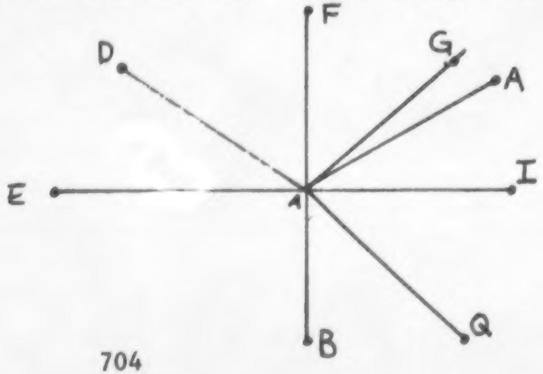


$\overleftrightarrow{LT}$ is the perpendicular bisector of $\overline{PQ}$ because it is perpendicular to $\overline{PQ}$ and it goes through the midpoint R of $\overline{PQ}$.



Ray $\overrightarrow{BD}$ is the bisector of angles ABC because it is inside the angle and angles ABD and DBC are congruent.

1. Complete the following statements:



1400

1401

a. Ray $\overrightarrow{AG}$ bisects angle _____ (EAB)

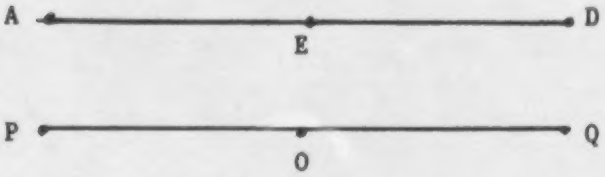
b. Ray $\overrightarrow{AH}$ bisects angle _____ (GAI)

c. Line _____ is the perpendicular bisector of $\overline{PQ}$. (AG)

d. Point _____ is the midpoint of $\overline{PQ}$. (A)

e. Which angles are congruent? $\angle$ GAH and $\angle$ HAI

2.



a. Construct a perpendicular bisector of line $\overleftrightarrow{AD}$. Construct a bisector for line $\overleftrightarrow{PQ}$. Name the midpoints of line $\overleftrightarrow{AD}$ and line $\overleftrightarrow{PQ}$.

CONTENT: Geometry

OBJECTIVE: The student will be able to recognize regular polygons of 10 or less sides. 7-8

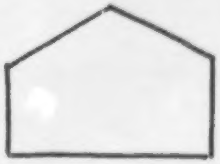
ACTIVITIES

Remember, polygons are classified according to the number of their sides.

NAME	SIDES
triangle	3
quadrilateral	4
pentagon	5
hexagon	6
heptagon	7
octagon	8
nonagon	9
decagon	10

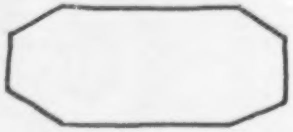
1. Classify each polygon according to the number of its sides.

a.



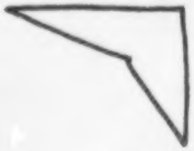
pentagon

b.



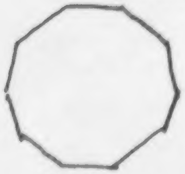
octagon

c.



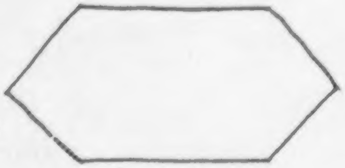
quadrilateral

d.



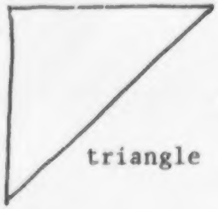
decagon

e.



hexagon

f.



triangle

2. Have students draw each of the polygons and measure the angles. Remember that all the sides of a regular polygon have the same length, and all angles have the same measure.

CONTENT: Geometry

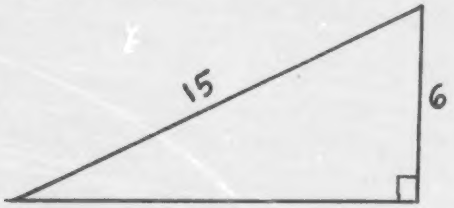
OBJECTIVE: The student will be able to use the Pythagorean Rule. 8

ACTIVITIES

Pythagorean Rule - In a right triangle the square of the hypotenuse is equal to the sum of the squares of the legs:

$$a^2 + b^2 = c^2$$

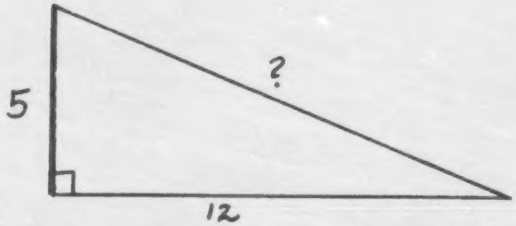
The Pythagorean Rule can be used to compute the length of any side of a right triangle from the known length of the other two sides.



$$a^2 + b^2 = c^2$$

$$6^2 + b^2 = 15^2$$

$$36 + 6^2 = 225$$
$$b^2 = \underline{189}$$
$$b = \sqrt{189}$$



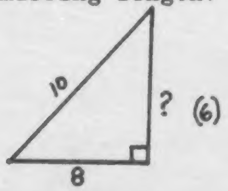
$$a^2 + b^2 = c^2$$

$$5^2 + 12^2 = c^2$$

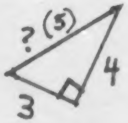
$$25 + 144 = c^2$$
$$\underline{169} = c^2$$
$$\sqrt{169} = 13$$

1. Find the missing length.

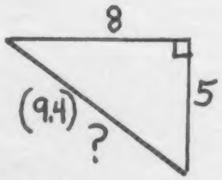
a.



b.



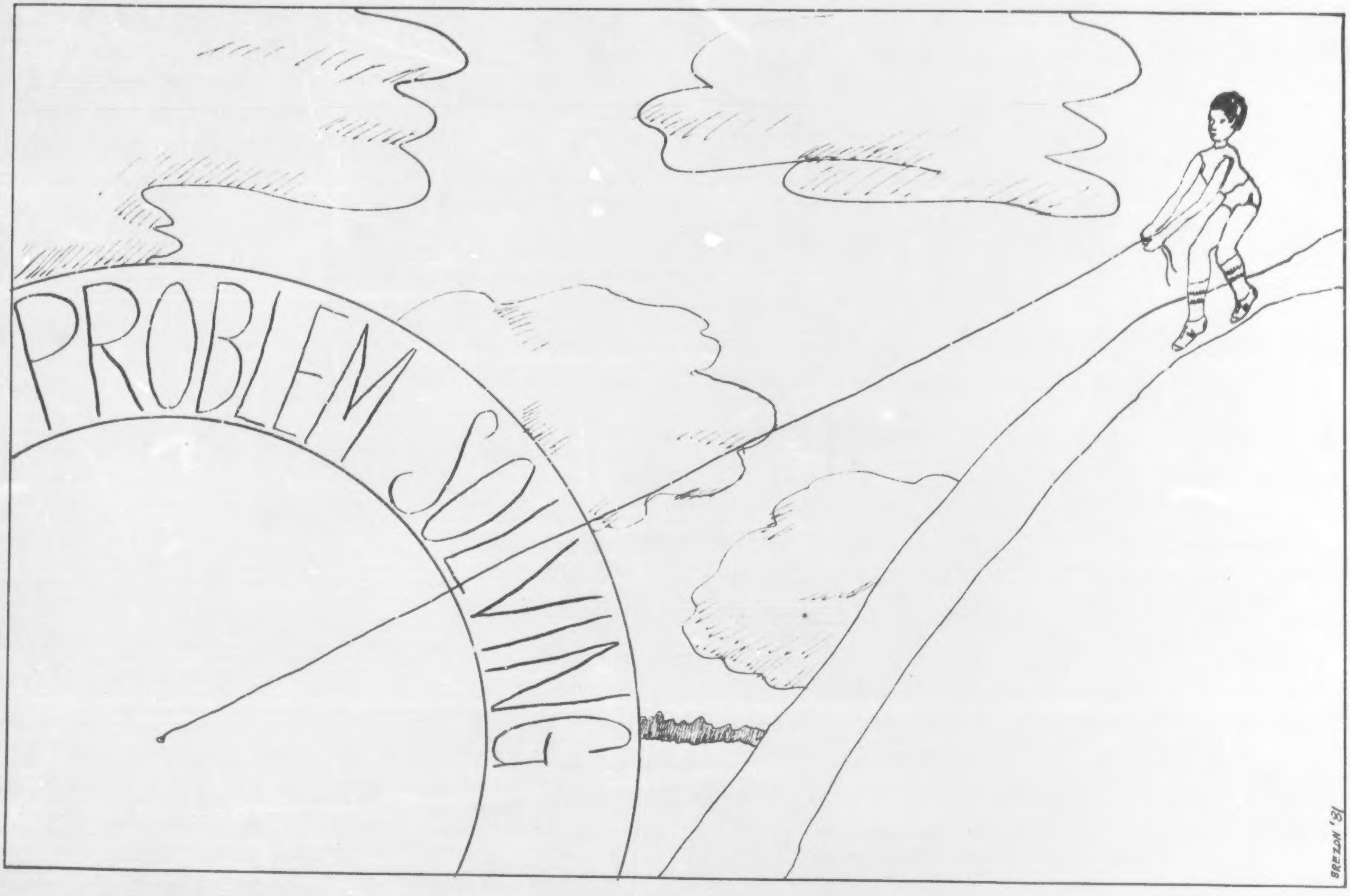
c.



2. Provide students with a geoboard or dot paper. Have them construct a right triangle and then construct a square on each of the sides.

1410

1411


PROBLEM SOLVING
BREZON '81

Problem Solving Techniques

Problem solving involves the application of all mathematics skills. Because it is the most important and the most difficult aspect of mathematics instruction, a special section of this guide is being devoted to it.

Unfortunately, there is not one instructional procedure for teaching problem solving. There are, however, a number of techniques teachers may utilize to help students become more proficient in this area. Following are some suggestions:

1. Display a poster with the general steps in problem solving. Discuss each step with the students, and work through a variety of examples with them. Although different texts may state the steps in different ways, the process is the same.

   With more advanced students, the steps may be presented as follows:

   a. Read the problem quickly. Try to obtain a general view of the problem situation and visualize the problem as a whole.

   b. Examine the problem again. Understand exactly what you are asked to find. This may be stated as a question or command. Circle the key word or words.

   c. Read the problem again to note what information is given. Look at exact numbers and values.

   d. Analyze the problem carefully to note the relationship of information given to what you are asked to find. (Steps b and c)

   e. Translate the relationships to mathematical terms. Indicate both the values and operations. This involves planning a sequence of steps which correspond to the operations. The end result will be one or more mathematical sentences.

   f. Perform the necessary computation.

   g. Examine the answer carefully. Label it to correspond to what the problem asks you to find. Decide whether or not your answer seems sensible.

With younger students the steps may be presented more simply:

a. Read the problem. Try to make a picture in your mind.

b. Find the question the problem asks.

c. Find the information the problem gives.

d. Think about the numbers given, the number wanted, and the arithmetic that should be done.

e. Do the arithmetic.

f. Answer the question in the problem.

g. See if the answer makes sense.

Based on these steps, questions may be provided for helping the students analyze the problem:

a. What are the facts in the problem?

b. What question does the problem ask?

c. What operation should be used to find the answer?

d. What number problem is to be worked?

e. Does the answer make sense?

2. For students who have difficulty analyzing problems, practice may be given in finding on specific part of the problem.

a. Have students read problem and:

(1) circle the facts given
(2) underline the question asked
(3) box the clues to the operation
(4) cross out irrelevant information

b. Give problems orally for the student to listen to and:

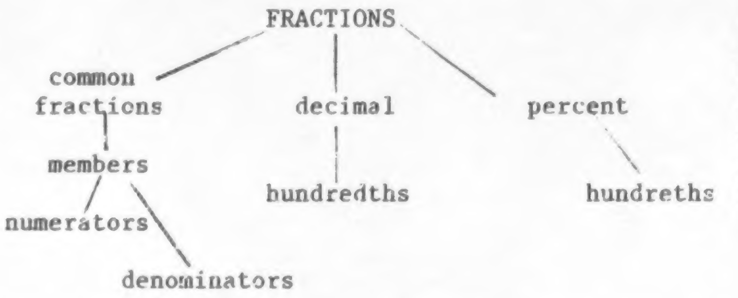
(1) hold up a symbol representing the operation (+, -, ÷, x).
(2) write the answers only.

3. Display and teach the vocabulary and symbols needed in problem solving. Use your text to determine the words needed most frequently. Structured overviews may be used to show relationships between these words.

WORDS I NEED
TO KNOW

add
difference
receive
estimate
approximate

OVERVIEW OF FRACTIONS


FRACTIONS
common fractions
decimal
percent
members
hundredths
hundreths
numerators
denominators

4. Compile and display on a chart a list of phrases which indicate operations to use in solving problems.

Use these clues to help decide whether to add, subtract, multiply or divide.

Add to join two groups
How many in all?

Subtract to separate a group into two groups or to compare two groups. How many are left? How many more? How many less?

Multiply to join two or more equal groups.
How many in all?
How much in all?

Divide to separate a group into two or more equal groups.
How many in each?
How much in each?

5. To call attention to how the question asked affects the operation performed, give students problems with extra information. Have them change the question asked to use the other information or perform another operation.

6. For students who have difficulty in reading the problems, tape record the problems or allow students to work together.

7. To assist students in visualizing the facts given in word problems, have them dramatize events, draw pictures to illustrate what it happening, make tables or graphs, etc.

8. For additional understanding of the structure of a problem, have students make up their own problems using objects collected in the classroom, magazine and catalog pictures, mathematical equations, etc.

9. For additional interest and motivation relate word problems to the student's everyday living; for example, "How much money will you need to get all your favorite foods at your favorite restaurant?"

10. Relate word problems to other content areas being studied. When studying weather, for example, construct problems related to the amount of rainfall, temperatures, etc.

11. Have students investigate careers in which mathematics is used: banking, carpentry, homemaking, architects, engineers, etc. Interview these people to find out the kinds of problems they solve daily and short cuts they have learned to use.

12. Give word problems related to all areas of mathematics. The following pages give sample problem-solving activities for some of the skill areas and show application of many of these techniques.

CONTENT: Problem Solving

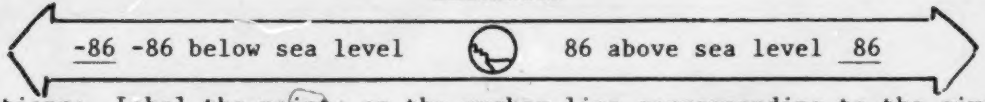
OBJECTIVE: The student will be able to solve problems involving negative and positive integers through real life situations.

ACTIVITIES

1. Explain to the students that integers are numbers that are used to describe things in our world that are opposites. For example, Fresno, California, has an altitude of 86m above sea level, while Death Valley, California, has an altitude of 86m below sea level. We use the integers 86 and -86 to describe these altitudes.

ELEVATION

Ex.



Directions: Label the points on the number line corresponding to the given integers.

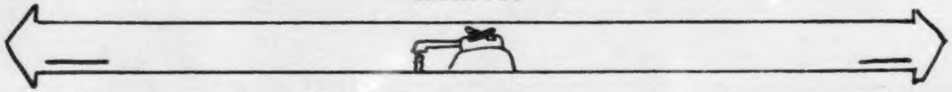
BANK ACCOUNT

a.

Deposit $9 (9)
Withdraw $9 (-9)

CAPACITY

b.



Take out 24 L (-24)
Put in 24 L (24)

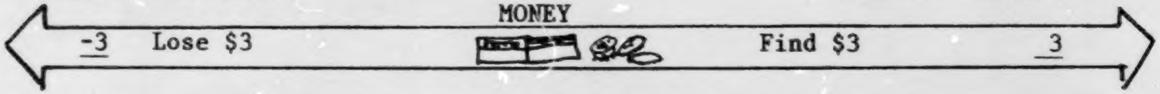
2. Find the sums.

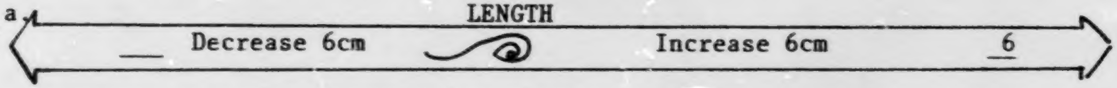
Example:	Receive $3		Pay out $5		Result?	
	3	+	-5	=	n	(-2)
a.	Receive $6		Pay out $2		Result?	($4)
b.	Receive $18		Pay out $9		Result?	($9)
c.	Receive $2		Pay out $7		Result?	(-$5)

3. Ask the children to look at the first example, which involves money. Notice with them that we associate the negative integer -3 (read "negative 3") with losing $3, while we associate the positive integer (or whole number) 3 with finding $3.

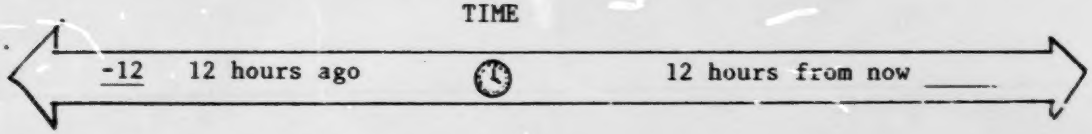
Example:

Negative Integers — Positive Integers


MONEY
-3
Lose $3
Find $3
3

a.

LENGTH
___
Decrease 6cm
Increase 6cm
6

(-6)

b.

TIME
-12
12 hours ago
12 hours from now ____

(12)

CONTENT: Problem Solving

OBJECTIVE: The student will be able to write number sentences for pictured action.

ACTIVITIES

1. Have children make up number stories and draw pictures to illustrate what is happening. Ask each child to tell a story and have the rest of the class tell what is happening and the answers.
2. Place several number sentences in a box. Let students draw a number sentence and write a short story about it. Stories can be illustrated and placed on the bulletin board.
3. Collect pictures from magazines and catalogs. Let students select a picture and write the number sentence at the bottom.

CONTENT: Problem Solving

OBJECTIVE: The student will be able to choose the addition or subtraction sentence to solve word problems with sums or minuends to 18.

ACTIVITIES

1. Choose the sentence to solve the problem.

   (1) Joe is 8 years old.
   Millie is 5 years older.
   How old is Millie?
   8 + 5 = 13
   8 - 5 = 3

   (2) Jack is 8 years old.
   Joan is 5 years younger.
   How old is Joan?
   8 + 5 = 13
   8 - 5 = 3

2. Complete the number sentence that answers the question.

   (1) Ed is 7 years old. Ned is 3 years older than Ed. Ted is 8 years older than Ned. How old is Ted?

   (7+3) + 8 = ______ (7+3) - 8 = ______

   (2) Carolyn had 9 problems correct on a math test one week. She had only 4 correct the next week. How many more did she have correct the first week?

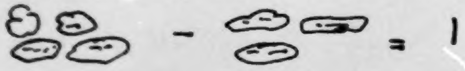
   9 - 4 = ______ 9 + 4 = ______

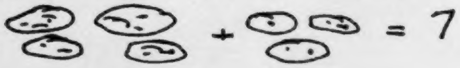
3. Review the following steps with students and then have students circle the picture that answers the question.

   (1) Read the problem. Try to make a picture in your mind.
   (2) Find the question the problem asks.
   (3) Find the information the problem gives.
   (4) Think about the numbers given, the number wanted, and the arithmetic that should be done.
   (5) Do the arithmetic.
   (6) Answer the question in the problem.

   Jerry ate 3 cookies for lunch. After school he ate 4 more cookies. How many cookies did he eat?

1428





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CONTENT: Problem Solving

OBJECTIVE: The student will be able to use addition and subtraction of two-digit numbers with no regrouping to solve problems.

ACTIVITIES

1. Make up short problems involving familiar fairy tales. For example: In *The Wizard of Oz*, Dorothy saw 23 Munchkins. Twelve Munchkins walked away. How many were left?

2. Have the students make up rebus word problems. They may exchange and solve each other's problems.

3. Have a flannelboard and felt cut-outs. Give the children a short story problem such as, "If I have 8 vanilla cookies and 10 raisin cookies, how many cookies do I have in all?" Call for a volunteer to go to the flannelboard, build two sets, and solve a problem. Continue other stories.

CONTENT: Problem Solving

OBJECTIVE: The student will be able to solve two-step word problems using addition, subtraction, multiplication, and division.

ACTIVITIES

1. a. Guide students in solving two-step word problems such as the following:

There are 30 children in our class. I have brought a bag of suckers to school. There are 12 red, 14 purple, 18 yellow, and 16 orange suckers. If I divide them equally among you, how many suckers will each of you get? (Substitute numbers to correspond to your class.)

b. Help students analyze the problem according to the steps for solving word problems. Keep these steps displayed in the class for easy reference:

(1) What are the facts in the problem?
12 red, 14 purple, 18 yellow, 16 orange suckers, divided equally
30 children
(2) What question does the problem ask?
How many suckers will each student get?
(3) What operation should be used to find the answer?
Divide when a large group must be made smaller.
(4) What number problem is to be worked?
Number of suckers ÷ number of students = number for each student

c. Guide students to see that they cannot figure how many suckers each child will get until they know how many suckers there are in all. To solve this, they must think through the steps in problem solving again:

(1) Facts? 12 red, 14 purple, 18 yellow, 16 orange suckers
(2) Question? How many suckers are there in all?
(3) Operation? Add to find how many there are in all
(4) Number problem? 12 + 14 + 18 + 16 = 60 suckers

d. Use the answer to complete the original equation: 60 ÷ 30 = 2 suckers each

e. Distribute the suckers as indicated to verify the results and remind students of the fifth step in solving problems: Does the answer make sense?

2. Write number sentences on 3" x 5" cards. Have students generate word problems requiring the given sentences.

Example:

$4 \times 20 = \boxed{80}$

$80 - 60 = \boxed{20}$

Twenty children made 4 potholders each to sell. If they sell 60, how many do they have left?

3. a. Compile and display on a chart a list of phrases which indicate operations to use in solving problems:

Use these clues to help decide whether to add, subtract, multiply, or divide.

Add to join two groups. How many in all?	Subtract to separate a group into two groups or to compare two groups. How many are left? How many more? How many less?
Multiply to join two or more equal groups. How many in all? How much in all?	Divide to separate a group into two or more equal groups. How many in each? How much in each?

b. Have students make four cards, one for each operation symbol:

$\boxed{+}$ $\boxed{-}$ $\boxed{X}$ $\boxed{\div}$

Read word problems to the students. After referring to the chart, each student holds up a card to indicate the operation which must be used to solve the problem.

CONTENT: Problem Solving

OBJECTIVE: After reviewing operations of whole numbers the student will be able to solve word problems involving addition, subtraction, multiplication, and division. (up to 3 steps)

ACTIVITES

1. Problems taken from the students' experiences will be appropriate to use in accomplishing this objective. Students can very likely create some very challenging problems to present to their classmates. Here are examples to help get the students started:

   a. The temperature at noon today was 84°. It is predicted to fall 19° below that tonight and then rise 23° above that by noon tomorrow. What will the temperature be tomorrow at noon?

   $(84^\circ - 19^\circ) + 23^\circ = \boxed{} \qquad 88^\circ$

   b. Susan got an 85 on her last math test. What score must she make on her next text to have a 90 average?

   $\frac{85 + \triangle}{2} = 90 \qquad \triangle = 95$

2. Have students write sentences for and then solve problems such as the following:

   a. Joe's mother wishes to plant tulips every 8 inches around the edge of her flower bed. The bed is rectangular; its width is 250 inches and its length is 370 inches. What is the perimeter of the flower bed? How many tulips will it take?

   P = (2 x 1) + (2 x w)
   P = (2 x 250) + (2 x 370)
   P = 500 + 740
   P = 1240
   1240 ÷ 8 = 155 tulips

3. Write several open sentences on transparency sheets to be distributed to your students. Have each student go to the overhead projector and create a story problem to fit one of his sentences. If the student makes up an appropriate story, allow him to call on someone to give the solution. Continue the activity until everyone is able to do the work successfully.

CONTENT: Problem Solving

OBJECTIVE: The student will be able to solve word problems using like fractions.

ACTIVITIES

1. a. Remind students that they should use the same steps in solving word problems with fractions that they use in solving other word problems. Illustrate using a problem like this:

   Betty brought 4 apples to school. She cut one into 8 parts. Betty ate 3/8 of the apple. Bonnie ate 2/8 of the apple, and Glenda ate 1/8 of the apple. How much more did Betty eat than Glenda? In looking for the facts, point out to students that word problems sometimes contain extra information that is not needed in solving the problem. They must look at the question asked to help them in selecting the important facts. Since we want to know how much more Betty ate than Glenda, the important facts are that Betty ate 3/8 and Glenda ate 1/8.

   b. Give out other problems. Have students cross out the irrelevant information and circle the important facts.

2. Give students problems with fractions and extra information. Have them change the question asked to use the other information or perform another operation. For example, with the problem in activity 1, the student could ask:

   a. How much of the apple did they eat in all?
   b. How much of the apple was left?

3. Read problems to the students involving fractions. Have them illustrate the facts with read objects, illustrations or fractional models. For example, with the problem in activity 1, they can actually divide an apple and use the parts, they can draw the apple's parts, or use a model showing eights of a shape.

1438 1439

CONTENT: Problem Solving

OBJECTIVE: The student will be able to solve word problems involving all basic operations on fractions.

---

1. You may separate the class into pairs of students. Give each pair several objects such as counters, beans, or bottle caps. Ask each pair of students to divide up the objects equally between themselves and write a sentence involving fractions to represent the result. For example, if Patty has 9 beans and George has 6 beans, then this partitioning of the set of 15 beans can be expressed in several ways:

$$\frac{9}{15} + \frac{6}{15} = 1 \qquad \frac{6}{15} + \frac{9}{15} = 1$$

$$1 - \frac{9}{15} = \frac{6}{15} \qquad 1 - \frac{6}{15} = \frac{9}{15}$$

2. Have the students create story problems involving the students in the class. For example:

   Sam, Tom and Bob decided to buy an amplifier together. If Sam pays 1/3 and Tom can only manage 1/4 of the total cost, how much will Bob have to pay? 1/3 + 1/4 + ( ) = 1. If the amplifier costs $97.92 including the tax, how much will each boy have to pay?

3. Provide a minimum of information and ask the students to create a story problem and its solution.

   a. 3/4 cup of milk for a cake, 3 cakes

   b. 2/3 mile, 1/2 that far

   c. Ate vitamins, ran 5 races, each 2/5 of a mile

   d. 3/5 of class is girls, 1/2 of the girls went to music

   e. 27 potato chips, ate 1/3

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CONTENT: Problem Solving

OBJECTIVE: The student will be able to solve word problems using addition and subtraction of decimals.

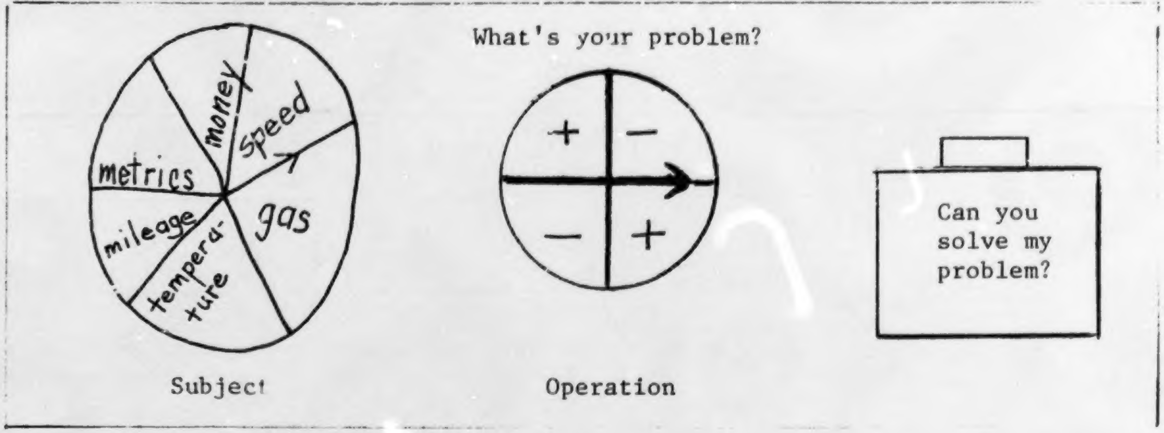
ACTIVITIES

1. Remind students that decimals are added and subtracted just like whole numbers. Work through a problem like the following, using the five steps in problem solving:

    Mr. Ross used 10.6 gallons of gas on Tuesday. He used only 5.3 gallons on Wednesday. How many more gallons did he use on Tuesday than Wednesday?

    Give some other problems using decimals. Have students:
    a. circle the facts given
    b. underline the question asked
    c. box the clues to the operation
    d. solve the equation

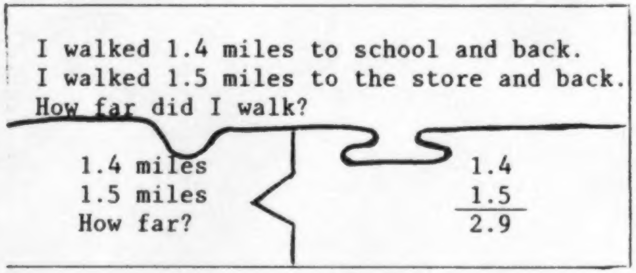
2. Create a "What's Your Problem?" board. Have students examine publications to see situations in which decimals are used in our everyday world: gas pumps, thermometers, odometers, rain gauges, wind speeds, metric measures, money, etc. Put those used on a spinner. Make a spinner for adding or subtracting also.


What's your problem?
money
speed
metrics
gas
mileage
temperature
+
−
−
+
Can you solve my problem?
Subject
Operation

Students spin to get the content and the operation to be used in writing their own decimal word problem. They put the solution on the back and store it for other students to solve.

3. Give students word problem puzzles with three pieces. On one piece put the problem. On one piece put a simplified version with just the facts and the question. On the third piece put the number problem.

Example:



I walked 1.4 miles to school and back.
I walked 1.5 miles to the store and back.
How far did I walk?

1.4 miles
1.5 miles
How far?

$$\begin{array}{r} 1.4 \\ \underline{1.5} \\ 2.9 \end{array}$$

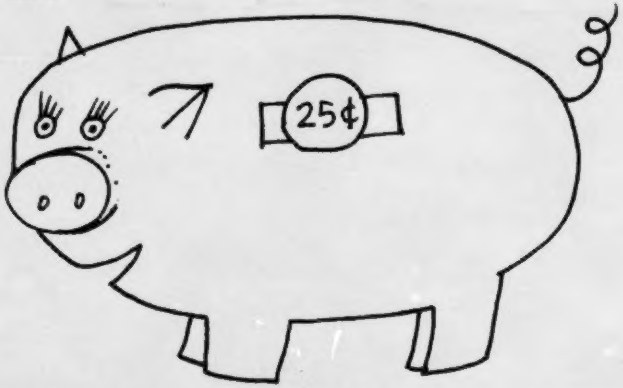
CONTENT: Problem Solving

OBJECTIVE: The student will be able to solve problems using money involving cent, nickel, dime, quarter, half-dollar to $1.00.

ACTIVITIES

1. Have children decide what kind of store they would like to have, then collect objects to stock it. For toystores and grocery stores use empty cans, boxes and jars with the labels still on. For pet stores or department stores use stuffed animals or cut pictures from magazines. Help them put price tags on each object and arrange the goods in an attractive display. Divide the students into groups and let them shop at the store, paying the price of the goods with play money. They then must work the problem on paper.

2. Make a large pink piggy bank from poster board. Behind the slip place an envelop containing "coins" on which numbers have been written. On some of the "coins" write amounts of money such as $37.00, 4¢, etc.



Near the bank place an envelope filled with small pigs which have been cut from construction paper. A student chooses two (or more) "coins" from the bank. On a small pig he writes an original problem using those numbers.

3. See activity 1.

CONTENT: Problem Solving

OBJECTIVE: The student will be able to solve two-step word problems involving amounts of money not to exceed $10. 3-5 *5

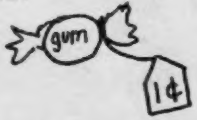
ACTIVITIES

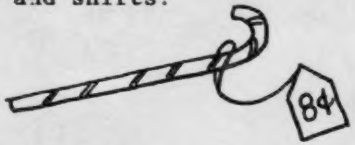
1. Solve the mini-problems:

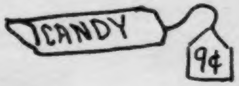
   a. Toy monkeys cost $2.60 each. Ann bought two monkeys. She gave the clerk $6.00. How much did the monkeys cost all together? How much change did she get?

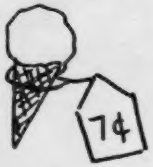
   b. Shirts cost $2.19. Hats cost $1.50. John bought one shirt and two hats. How much money did John need to buy the hats and shirts?

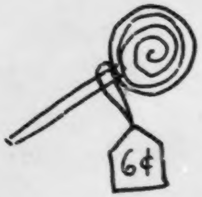
2. Complete:







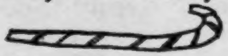




   a. How many pieces of gum can you buy with 25¢? ________

   b. How many lollipops can you buy for a dime? ________

   c. How many candy bars can you buy with 20¢? ________

   d. How many  can you buy with a quarter? ____________

   How much change will you have left? ________________

3. Solve:

   a. Harry had a nickel and 4 pennies. He spent 6¢ for candy. How much has he left? ______

   b. John had a dime and 6 pennies. He spent 9¢ for a pencil. How much did he have left? ________

   c. Mike and his mother went shopping. Mike bought a sweater for $4.79 and shoes for $2.89. How much did his sweater and shoes cost? ________

CONTENT: Problem Solving

OBJECTIVE: The student will be able to solve word problems involving time in hours only and in minutes only.

ACTIVITIES

1. Display a demonstration clock and present this problem.

   Ann left home at 8:35. She arrived at school 13 minutes later. What time did she arrive at school? Have the students set the clock at 8:35 and move the minute hand around 13 minutes. They may count the minutes as the hand is moved. Guide the children to write 8:48.

   Set the clock to read 2:05. Ask the students to read the time. Then ask, "What time was it 20 minutes ago?"

2. Solve the following:

   (1) It is 6:25. What time was it 1 hour and 10 minute ago? _________
   (2) It is 10:47. What time will it be in 1 hour and 20 minutes? _________
   (3) It is 10:25 in the morning. How many minutes is it until noon? _________

3. Using a demonstration clock have one child show a time on the clock, let other students show on individual clocks that time five minutes later. Repeat for other minutes.

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CONTENT: Problem Solving

OBJECTIVE: The student will be able to solve two-step word problems involving time in hours only and minutes only.

ACTIVITIES

1. Review the steps used in solving problems. Tell them that today's word problems about time will have two problems in one.

   a. Sample 1: We read from 9:00 A.M. until 11:00 A.M. Then we did math for one hour. How much time did we spend on math and reading? Guide students to locate the facts:
   Reading 9:00 A.M. until 11:00 A.M.
   Math - 1 hour
   As they work through the five steps, help them to see that they must know how much time they spent on reading before they can add to see how much time they spent in all. Have them use a clock to see that there are two hours from 9:00 till 11:00. Then, add the 2 hours reading to the 1 hour for math.

   b. Sample 2: We began art at 1:00 P.M. We painted for 10 minutes, cleaned up for 10 minutes, and shared for 15 minutes. Then we went to recess. What time did we go to recess? Guide students to locate the facts. Help them to see that they must know how many minutes had passed since 1:00 before they can know what time it is now. Have students add: 20 + 10 + 15 = 45. Then use the clock to show 45 minutes added to 1:00.

2. Give students problems to compute requiring changes from A.M. to P.M. Have them use the clock to verify their answers. Examples:

   a. Bill works from 8:30 P.M. to 1:30 A.M. How many hours is that?
   b. Beth works the night shift from 11:00 P.M. to 7:00 A.M. How many hours is she at work?

   Students may pretend to be payroll workers. Workers' names, starting times and ending times are placed on time cards. Students compute the time worked and compute their pay at $3.00 an hour.

3. Give students charts like the following to complete using individual clock models. They will show a given time on their clock, then show 1 minute later and 30 minutes later.

Time	1 minute later	30 minutes later
7:05		
4:25		
9:20		
12:15		
2:10		
3:11		

CONTENT: Problem Solving

OBJECTIVE: The student will be able to solve word problems involving weight, units of pounds or ounces only (no conversion).

ACTIVITIES

1. Use the grocery sales section of the newspaper. Have students make a list of the things that are sold by the pound. Have the students group the items according to produce, meats, etc.

2. Solve.
   Example:
   (1) Mary bought 2 pounds of meat and 6½ pounds of rice. How many pounds did she buy all together?

   (2) Cabbage costs 19¢ a pound. How many pounds can Ann buy for 50¢?

3. Complete:

   (1) Mary has 2 pounds of butter to sell. Ann's mother bought 1½ pounds. How many pounds did Mary have left? _________

   (2) John bought 10 pounds of ice. When he arrived home he only had 4½ pounds. How many pounds of ice melted? _________

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CONTENT: Problem Solving

OBJECTIVE: The student will be able to solve word problems involving grams and/or kilograms, no conversion.

ACTIVITIES

1. Make a list of various animals which might be found in the zoo. Have students list the animals from heaviest to lightest. Discuss how the units of gram and kilogram could be used to compare heavy animals and light animals. Use the animals the students listed to record the appropriate units. g or kg.

2. Write the names of 10 animals on cards and the corresponding measures in kilograms on other cards (rounded to the nearest 100 kg). The cards are placed face down for a game of "Concentration." The object of the game is to collect as many corresponding pairs of cards as possible. A chart should be provided to list the corresponding cards for student's reference.

3. Select the best answer A, B, or C for the approximate weight.

		A	B	C	
a.	Baby gorilla	40g	400g	400kg	(B)
b.	Baby elephant	40g	400g	400kg	(C)
c.	Water buffalo	30g	300g	300kg	(C)

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